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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Horticultural Crops Research Branch

THE NATIONAL POTATO-BREEDING PROGRAM, 1955

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By
F. J. Stevenson and Others,
Section of Vegetable Crops,
and
State Cooperators

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(Twenty-sixth Annual Report to Cooperators)
Plant Industry Station
Beltsville, Md.

March 1956

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NATIONAL POTATO-BREEDING PROGRAM, 1955
F. J. Stevenson

This is the 26th annual report of the National Potato-Breeding Program. It is the last report for which I will be responsible. I am retiring May 31, 1956.

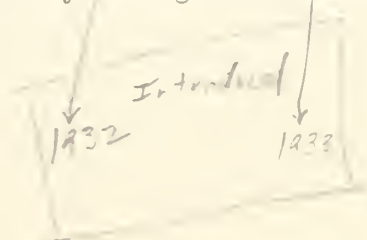
457
127
28 yr.
In 1929 the program was organized to be conducted cooperatively between the U.S.D.A. and interested State agricultural experiment stations. In 1930, when I assumed the leadership of the program, 9 states had signed agreements of understanding with the U.S.D.A. and the first report consisted of 6 type-written pages. How the program has grown can be appreciated by a comparison between the 6 pages in the 1930 report and this report for 1955.

We have cooperated with horticulturists, agronomists, plant pathologists, entomologists, and physiologists, and 90 percent of the cooperation has been whole-hearted and pleasant. I appreciate this and hope you will maintain the same relationships with my successor, Robert V. Akeley. Bob and I have worked together for years. He knows the problems that confront the potato industry in the various States and will do all in his power to help solve these problems. He is an excellent cooperator and has the national viewpoint.

In this summary I can only hint at the numerous advances that have been made. About 45 new varieties have been named and released since 1932. A few of these were produced earlier and a number resulted from sports of named varieties. About 60 percent of the seed certified in the United States in 1955 was of varieties released under this program.

Numerous varieties and a few lots of true seed were imported from abroad. None of the varieties were adapted to growing conditions in this country, but they have contributed genetic characters that are very useful in building up breeding stocks and varieties. Among the valuable characters found in foreign material is resistance to scab, late blight, verticillium wilt, leaf roll, ring rot, brown rot, and golden nematode.

(We have produced and maintained parent lines running into the hundreds that harbor combinations of characters that have never been known before. The oldest one of these is seedling 24642, self-fertile and field-immune from mild mosaic, produced by Dr. William Stuart in 1913, and a number of varieties and seedlings produced by Dr. C. F. Clark from 1919 to 1922. Two of the latter, Katahdin and Chippewa, have been of untold value to the potato industry, and two of them, 41956, first grown in 1921, and Katahdin, first grown in 1923, have been of untold value to potato breeders in the United States and many foreign countries.



1956
1930
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Yields

The 1955 season in Maine seemed to favor early varieties. In one test on the Aroostook Farm Irish Cobbler yielded 743 bushels of U.S. No. 1 potatoes per acre. A medium early variety, B 3114-67, resistant to late blight, scab, and ring rot, yielded 823 bushels of U.S. No. 1 per acre. However, it had two faults: Its tubers were too large and its dry-matter content low. Perhaps another environment would remedy these defects.

Fourteen varieties were grown at three locations in Maine. The ability to yield at all locations was demonstrated by Saco, Kennebec, Red Pontiac, and Cherokee. Russet Burbank yielded less than any of the 4 mentioned.

Total Solids

The percentage of total solids was relatively high in some States and relatively low in others. In Kern County, California, 12 out of 14 varieties ranged from 21.0 percent for Kennebec to 23.5 percent for Delus. Russet Burbank produced 22.2 percent, Ontario 22.0 percent, and Katahdin 21.8 percent. (Calif. table 1). At Presque Isle, Maine, only 2, Saco and Mohawk, out of 24 varieties showed a percentage of total solids higher than 20 percent. Russet Burbank produced tubers with 18.7 percent of solids the same as Katahdin and Kennebec. For the average of 3 locations Mohawk produced 19.7 percent solids, Saco 19.1, Russet Burbank 17.6, Kennebec 17.7, and Katahdin 17.9 (Cunningham table 1). The extreme effects of environment are seen if Delus grown in Kern County, California, with 23.5 percent solids is compared with the same variety grown in Connecticut with 16.2 percent dry matter.

The effects of fertilizer treatments on yields and total solids are seen in the reports of tests from Parma, Idaho. Sansted table 1 shows that as more fertilizer is applied the yields on the average increase, but the percentage total solids decrease. Perhaps if high dry matter is desirable high yields will have to be sacrificed.

Late Blight

The report from Mexico from John S. Niederhauser et al. shows progress in producing seedlings with field resistance to the physiologic races of the fungus that occurs at Toluca, Mexico. The crosses are made at Beltsville and screened in the seedling flats with several physiologic races by R. W. Buck, Jr., and Lillian Cash. The survivors are grown to maturity in 3-inch pots in the greenhouse, and the resulting tubers are sent to Dr. Niederhauser for a field test at Toluca, Mexico, where the "killer" race is supposed to be prevalent. The so-called "minor" genes, which are not minor genes in the genetic sense, found in the cultivated varieties of potatoes such as Menominee, Ontario, Sebago, Saranac, and many others seem to condition field resistance to all the physiologic races of the fungus prevalent at Toluca,

Mexico. These genes, which were the only ones we had in our early program of breeding for resistance to late blight, are again being given major emphases. Two seedlings, accession Nos. 25949 and 25953, sent to us from the Max Planck Institute, in Germany, have been noted as sources of field resistance in the tests in Mexico, and the progenies of crosses in which their genes are involved are again outstanding. They are both related to Solanum demissum and seem to be transmitting both major and minor genes to their progeny.

Scab

Physiologic races and environment continue to complicate the problem of breeding for resistance to scab. The uniform scab nurseries tested in Maine and sent to 7 other State agricultural experiment stations emphasize this point. Some of the seedling varieties showed a high degree of resistance in the scab tests in Maine but failed to produce marketable tubers in some of the other tests.

The most promising report came from California. The data for this test are presented in Calif. table 2. In discussing the data in this table Glen Davis says: "For the first time in 17 years some really promising resistant material was isolated." No uniform scab tests will be sent out in 1956, but many good selections should be available for the 1957 nursery.

Leaf Roll

When the project of breeding for leaf roll resistance was undertaken extensive plug-graft tests were made. Nothing was found resistant under the conditions of these tests. Field tests were then begun in cooperation with Donald Folsom who conducted the tests at Highmoor Farm, Maine. It soon became evident that genes for field resistance to leaf roll were available in foreign introductions and in some of our domestic varieties. Houma is highly resistant in the field, and a selection from the cross Houma x Katahdin, 1276-185, is one of the most resistant varieties that has come out of these tests.

Seedling 1276-185 has been grown continuously for 4 years at Salisbury, Md., and while many other varieties would have "run-out" in that time this seedling in 1955, grown from fourth-generation seed produced in Maryland unrogued plots, yielded higher than it did from Maine-grown seed. The resistance to leaf roll and other virus diseases is reflected in these results.

The present method of testing for resistance to leaf roll as practiced by Simpson and Bonde, of applying viruliferous aphids to the seedlings under test, eliminates many seedlings that might show as much resistance as 1276-185 and others, but progress is evident in the report by Simpson and Bonde.

Net Necrosis

Thirteen varieties were exposed in the field on Aroostook Farm to leaf roll to test their reaction to net necrosis. Katahdin, Merrimack, Red Pontiac, and B 595-76 did not contract net necrosis; five others showed only a trace of the disease, but 3 varieties were rather heavily infected. Delus showed 42.6 percent infection, Mohawk 43 percent, and Russet Burbank 19.5 percent.

Solanum Species and Species Hybrids

Much progress is reported, in studying the cytology and crossability of species and species hybrids, by D. C. Cooper et al., of the University of Wisconsin.

R. W. Buck, Jr., Plant Industry Station, Beltsville, has studied the meiotic behavior of chromosomes in the microsporocytes of 41 diploid species and clones, of 48 tetraploid species and clones, and of 2 hexaploid species. In 1955, 191 hybrids between diploid species set fruit and 187 produced seed. Sixteen diploid species were pollinated with Katahdin pollen. Seven set fruit and two produced seed. Katahdin pollen was used for 71 diploid interspecific hybrids; 48 set fruit and 30 produced seed. The chromosome numbers of these progenies are being studied in a search for tetraploids that may be used in crosses with cultivated varieties. Tetraploids have been induced from diploid species by colchicine treatment.

Inter-regional Potato Introduction Project

Hougas and Ross report that in 1955 new Solanum stocks were introduced from 15 foreign countries. Good increase of true seed was obtained in the greenhouse during the spring season.

An inventory of the Solanum stock in the collection is being assembled. Copies of the new inventory will be distributed through the mailing list of the project and upon request of interested technical workers.

New Varieties

Red Beauty was released jointly by the experiment stations of Wisconsin and North Dakota. Plymouth and Boone were released jointly by the U.S.D.A. and the North Carolina Agricultural Experiment Station.

PLANT INDUSTRY STATION (Beltsville, Md.) and
CHAPMAN AND AROOSTOCK FARMS (Presque Isle, Maine)

F. J. Stevenson, R. V. Akeley, R. W. Buck, Jr., R. E. Webb,
E. S. Schultz, and Lillian Cash

Plant Industry Station

At the Plant Industry Station, Beltsville, Md., the crossing and selfing program, involving better market and cooking qualities combined with resistance to various diseases, was continued with greater emphasis on resistance to verticillium wilt, and golden nematode. The work with species and species hybrids was increased. Crosses that will produce varieties with multiple resistances were made. A number of crosses were made for the southern region in which red tuber color and resistance to late blight and scab were emphasized.

Distribution

The distribution of seed, new seedlings, and tubers of named and numbered varieties was continued. A summary of the shipments made in 1955 is given in P.I. tables 1 to 4. The seed, new seedlings from the greenhouse, and small lots of seed stock for States and foreign countries were shipped from the Plant Industry Station but a number of shipments were made directly from Presque Isle, Maine.

P. I. table 1. Distribution of potato seed to State agricultural experiment stations and to foreign countries, 1955.

State, Territory, or foreign country	Cooperator	Progenies
Japan	K. Kawakami	2
Scotland	C. H. Cadman	1
Yugoslavia	Zdenko Vitasovic	16
Louisiana	T. P. Dykstra	15
Michigan	C. E. Peterson	22
Washington	M. W. Carstens	48
Wisconsin	R. H. Larson	6

P. I. table 2. Distribution of new seedlings from greenhouse at Beltsville, Md., 1955.

Country or State	Cooperator	Number of progenies	Number of seedlings
Mexico	John S. Niederhauser	38	3,881
Iowa	A. E. Kehr	25	2,784
Louisiana	T. P. Dykstra	22	1,774
Maine	Reiner Bonde and G. W. Simpson	28	5,057
Maine	R. V. Akeley	161	21,185
North Dakota	W. G. Hoyman	28	2,407
Ohio	J. P. Sleesman	36	3,697

P. I. table 3. Distribution of named and numbered varieties to foreign countries.

Country	Cooperator	Number of varieties
Africa (So. Rhodesia)	United Kingdom Sci. Mission	2
Australia	S. Fish	3
Australia	A. C. Orman	19
Belgium	N. Rigot	6
Canada	Elzear Champagna	3
Canada	Walter T. Manchester	6
Canada	O. M. McConkey	3
Canada	J. A. Menzies	6
Canada	R. C. Layton	1
Canada	German Bourassa	13
Canada	E. Wharton Shaw	2
Canada	C. F. Patterson	1
Canada	N. M. Parks	3
Canada	G. W. Ayers	5
Dominican Republic	Wm. G. Bradley	1
Germany	Hans Ross	5
Iceland	Sturla Fridriksson	3
Iraq	Abdul Ghafour	16
Israel	Amihud Kramer	1
Israel	I. Arnon	3
Italy	Dir. Inst. di Allevamento Veg.	15
Italy	Victor B. Sullam	2
Philippines	Paul Work	8
South Africa	Dept. of Agriculture	1
Spain	P. de la Hera Y Saenz	10
Yugoslavia	Zdenko Vitasovic	29
Philippines	M. Idanez	17

P. I. table 4. Distribution of named and numbered varieties to Territories and States.

Territory or State	Cooperator	Number of varieties
Alaska	C. H. Dearborn	6
California	A. Herbert Gold	1
California	Glen N. Davis	34
Colorado	R. E. Finley	1
Colorado	Cecil W. Frutchev	8
Colorado	W. C. Edmundson	14
Connecticut	Julius Wetstone	1
Connecticut	Arthur Hawkins	9
Connecticut	C. L. Clark	1
Delaware	E. P. Brasher	11
Florida	A. H. Eddins	13
Florida	W. T. Forsee	4
Georgia	Hubert Chambers	5
Idaho	John G. McLean	32
Iowa	A. E. Kehr	9
Iowa	W. J. Hooker	3
Kentucky	Clyde Singletary	15
Louisiana	T. P. Dykstra	7
Maine	R. V. Akeley	48
Maryland	C. E. Cox	18
Maryland	L. E. Gregory	1
Massachusetts	Robert Mullany	11
Massachusetts	Karl J. Kucinski	15
Michigan	N. R. Thompson	21
Michigan	D. R. Isleib	4
Michigan	C. E. Peterson	5
Minnesota	O. C. Turnquist	35
Minnesota	Carl J. Eide	32
Minnesota	C. Ochoa	4
Montana	H. N. Metcalf	3
Nebraska	H. O. Werner	1
New Jersey	J. C. Campbell	32
New Hampshire	P. T. Blood	4
New York	George McCoy	1
New York	M. W. Meadows	12
New York	L. C. Peterson	300
New York	R. J. Zedler	2
New York	H. J. Evans	3
New York	Maria Krofta	1
North Carolina	Frank Haynes, Jr.	7
North Carolina	L. W. Nielsen	1
North Dakota	Ben Picha	3
North Dakota	G. W. Hoyman	45
Ohio	John Bushnell	1
Oregon	H. J. O'Reilly	6

P. I. table 4 continued

Territory or State	Cooperator	Number of varieties
Pennsylvania	Wise Potato Chip Co.	3
Pennsylvania	J. S. Cobb	16
Rhode Island	J. E. Sheehan	19
South Carolina	W. M. Epps	31
South Dakota	C. M. Magel	14
Texas	D. W. Newsom	13
Texas (Weslaco)	P. W. Leeper	83
Texas	J. M. Coruthers	20
Virginia	Flood S. Andrews	4
Virginia	P. H. Massey, Jr.	12
Washington	M. W. Carstens	83
Washington	J. D. Menzies	21
West Virginia	K. C. Westover	3
Wisconsin	D. B. Robinson	1
Wisconsin	R. H. Larson	21
Wisconsin	E. D. Jones	6
Wisconsin	H. M. Darling	5
Wisconsin	G. H. Rieman	18
Wisconsin	R. W. Hougas	6
Wyoming	J. R. Vaughn	19

Chapman Farm, Maine

Sixteen newer varieties or promising seedlings were increased in various amounts on about 3 acres of land at Chapman, Maine. Approximately 900 bushels was harvested for future tests, distribution and increase.

In P. I. table 5 a summary of the maturity and fertility data on the 10-hill rows grown on Chapman Farm is presented. The 1955 season was excellent for taking these readings. It is interesting to note that 49.8 percent of the 2,186 seedlings were judged early to medium in maturity and that 43.6 percent of the total number were slight to good for fertility. Several hundred selections were made in the 10-hill plots for either parents, distribution, or retesting in 1956.

Approximately 21,200 seedlings, representing 161 family lines grown in the greenhouse at Beltsville, Md., were planted for increase on the Chapman Farm. Over 96 percent germinated and 2,091, or roughly 10 percent, were selected at harvesttime for increase in 10-hill rows and inclusion in 9 different tests in 1956, as indicated in P. I. table 6.

P. I. table 5. Maturity and fertility data of seedlings grown in 10-hill rows on the Chapman Farm in 1955.

Maturity classes	Seedlings		Fertility classes	Seedlings	
	No.	Pct		No.	Pct.
Early	271	12.4	None	1233	56.4
Medium	817	37.4	Slight	123	5.6
Late	1023	46.8	Medium	454	20.8
Very late	75	3.4	Good	376	17.2
Total	2186	100.0		2186	100.0

P. I. table 6. A summary of single-hill seedlings grown on the Chapman Farm in 1955, showing the total number planted, grown, selected and intention for 1956 tests.

Planted	Grown	Select- ed	Late blight	Scab	Ring rot	Virus X	Virus Y	Leaf roll	Vert. wilt	Vita- min C	Golden nematode
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
21,202	20,439	2,091	769	362	349	423	500	1,017	404	820	54

Aroostook Farm, Presque Isle, Maine

The season in Maine was exceptionally good for growing potatoes in 1955. In order to keep the seed size down on the material planted in the breeding and increase plots the vines were killed or the tops pulled as early as August 16. The regular increase plot, the variety collection, the breeding plot, and material replanted for a golden nematode resistance study consisted of several hundred seedlings and varieties grown on about 4 acres of land and handled in such a way as to insure the best possible seed under the present growing conditions.

Yield Tests

In spite of the good growing conditions, the variability in the test plots was greater than usual. Twelve early or medium maturing varieties were tested in comparison with Irish Cobbler and Chippewa. The data for this test are given in P. I. table 7. B 3114-67, a medium-maturing variety, resistant to late blight, scab, and ring rot, ranked No. 1 in yield but was rather low in dry-matter content.

P. I. table 7. Early and medium maturing variety test, Aroostook Farm, Presque Isle, Maine, 1955

Variety	U.S. No. 1 tubers				
	Per acre		Per plot	Ave. weight	Solids
	Bu.	Pct.	No.		
Irish Cobbler	743	97	121	6.7	20.0
Chippewa	783	96	115	7.3	17.1
B 73-3	664	97	96	7.3	19.7
B 75-4	420	98	50	8.1	19.5
B 137-5	648	96	90	7.5	17.9
B 920-5	503	96	82	6.4	15.3
B 920-7	629	96	98	6.6	19.1
B 962-3	614	97	95	6.9	19.6
B 2997-9	590	99	80	7.8	17.3
B 3014-6	612	94	114	5.3	17.2
B 3097-16	642	98	67	9.6	19.5
B 3114-67	823	99	66	12.7	16.3
B 3331-7	629	97	100	6.3	18.4
B 3353-6	729	96	122	6.4	18.6
L.S.D. .05 level	83		19		1.1

Twelve early or medium early varieties were tested in comparison with Irish Cobbler and Chippewa. The season seemed to favor early varieties. Irish Cobbler yielded 743 bushels of U.S. No. 1 potatoes per acre with a dry-matter content of 20 percent. The variability was somewhat higher than usual so that small differences were not significant. B 3114-67 ranked No. 1 in yield with 823 bushels per acre. However, the average size of its U.S. No. 1 tubers was 12.7 ounces and its dry-matter content only 16.3 percent, both undesirable characteristics (P. I. table 7).

Twelve late-maturing varieties were tested in comparison with Saranac and Teton. Teton ranked first in yield of U.S. No. 1 potatoes but due to the high standard error, Saranac and 4 of the numbered varieties were in the same class as Teton. B 2894-24, a selection from a cross between Kennebec and Teton, yielded 688 bushels per acre. This seedling variety is resistant to late blight, scab, and mild mosaic. Five Colorado seedlings were included in the test. The yields of these were relatively low. With the exception of B 3414-4 the tubers of the 14 varieties were all in the same class as Teton in percentage of solids, if the L.S.D. is taken into consideration. (P.I. table 8).

P. I. table 8. Late-maturing variety tests Aroostook Farm, Presque Isle, Maine, 1955.

Variety	U. S. No. 1 tubers				
	Per acre		Per plot mean	Average weight	Solids
	Bu.	Pct.	No.	Oz.	Pct.
Saranac	616	94	105	6.4	18.5
Teton	690	99	95	7.5	18.7
B 2340-2	419	96	49	9.0	20.0
B 2879	598	99	83	7.8	18.7
B 2894-24	688	98	72	9.5	17.8
B 3353-15	657	96	109	6.5	17.9
B 3414-4	546	99	44	13.4	16.7
B 3427-7	488	87	105	4.9	17.7
B 3428-20	637	98	100	7.1	18.3
B 3429-23	628	96	113	6.2	19.0
CS 11888	345	96	58	9.9	18.6
CS 11889	281	96	38	7.3	18.2
CS 11918	559	94	96	5.9	19.8
CS 12240	508	87	101	5.1	19.2
L.S.D. .05 level	94		22		1.3

Late Blight Injury as Reflected in Yields and Percentage of Solids

The 1955 season in Maine was one in which late blight could be controlled on susceptible varieties if control measures were carried out properly.

The performance of 9 new varieties that are highly resistant to late blight was compared with Katahdin, Menominee, and Sebago. The 12 varieties were sprayed at 7-day intervals, 12 times, with 4 spray treatments: Water, DDT, dithane, and dithane + DDT. Katahdin, a susceptible variety, yielded 385 bushels of U.S. No. 1 tubers per acre when sprayed with water alone and 392 when sprayed with DDT alone. However, when sprayed with dithane or dithane + DDT Katahdin yielded more than 600 bushels per acre. In every case the yields of the blight-resistant varieties sprayed with dithane were significantly higher than the yields of the same varieties sprayed with water or DDT alone. The value of the genes that condition blight resistance was not so evident in 1955 as it was in 1954. The tubers of all varieties were significantly higher in percentage of total solids when the plots were sprayed with dithane than when the plants were grown without the applications of a fungicide (P.I. table 9).

P. I. table 9. Reactions of 12 potato varieties to late blight as reflected in yields and percentage solids^{1/}, Aroostook Farm, Presque Isle, Me., 1955.

Variety	Reaction to late blight ^{2/}	Sprays applied, yield ^{3/} per acre and percentage solids ^{4/}									
		Water		DDT		Dithane		Dithane+DDT		Means	
		U.S.		U.S.		U.S.		U.S.		U.S.	
		No.1 Solids		No.1 Solids		No.1 Solids		No.1 Solids		No.1 Solids	
		Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
Boone	HR	437	16.3	536	16.3	614	18.4	564	17.4	538	17.1
Cherokee	HR	382	16.9	438	17.2	577	18.9	573	19.8	493	18.2
Delus	HR	341	18.4	391	18.2	526	21.6	439	20.7	424	19.7
Katahdin	S	385	15.6	392	14.6	618	18.8	604	17.8	500	16.7
Kennebec	HR	566	16.9	547	16.0	730	19.3	701	19.2	636	17.9
Menominee	MR	547	16.9	515	17.2	685	19.1	713	19.4	615	18.2
Merrimack	HR	393	17.7	361	17.6	513	19.8	448	20.1	429	18.8
Plymouth	HR	519	17.2	531	16.7	655	18.2	632	18.3	584	17.6
Saco	HR	495	18.8	596	17.9	731	19.9	705	20.9	632	19.4
Sebago	MR	480	15.4	429	14.6	635	18.2	636	18.1	545	16.6
B 355-35	HR	408	15.8	415	15.6	564	19.0	562	18.9	487	17.3
B 922-6	HR	338	19.0	396	18.9	413	18.3	413	17.7	390	18.5
Means		441	17.1	462	16.8	605	19.1	583	19.0		

^{1/} Based on specific gravity of tubers.

^{2/} HR, highly resistant; MR, moderately resistant; S, susceptible.

^{3/} Difference between two variety means at .05 level, 31 bushels.
Difference between means of same variety for any two treatments, 10.7 bushels.

^{4/} Difference between two variety means at .05 level, .7%
Difference between means of same variety for any two treatments, 1.32%.

Variety Test in Wilt-Sick Soil

Seventeen varieties of potato were grown at Caribou, Maine, in soil infested with fungus that causes verticillium wilt. 792-88, 792-94, and 41956 again were highly resistant showing less than 10 percent infection. Ontario showed only 4 percent infection in 1954 but 16 percent in 1955; Houma, 8 percent in 1954 but 30 percent in 1955; and Russet Burbank 9 percent in 1954 but 51 percent in 1955. Again, there was little or no correlation between yield and percentage wilt infection. Houma produced the highest yield, 635 bushels of U.S. No. 1 potatoes per acre, but when the least significant difference at the 5-percent level is considered, Ontario, Red Pontiac, Saco, and Sequoia were in the same class as Houma. B 579-3, 792-94, and 41956 were significantly higher in percentage of solids than Houma and Irish Cobbler. Saco, Menominee, Merrimack, Russet Burbank, and 792-88 were in the same class as Houma in dry-matter content (P.I. table 10).

P. I. table 10. Reaction to verticillium wilt as reflected in yields and percentage solids of 17 varieties of potato grown in wilt-infested soil on the Ashby Farm, Caribou, Maine, 1955.

Variety	Wilt	U. S. No. 1 yield per acre		Solids
	Pct.	Bu.	Pct.	Pct.
Houma	30	635	94	17.6
Irish Cobbler	99	495	95	17.1
Katahdin	50	458	96	15.9
Kennebec	88	496	94	15.4
Menominee	57	517	96	16.6
Merrimack	59	376	95	17.6
Ontario	16	616	92	16.2
Plymouth	69	485	97	16.1
Russet Burbank	51	411	86	17.0
Red Pontiac	87	583	96	15.1
Saco	68	592	96	18.0
Sebago	37	465	96	16.3
Sequoia	43	602	96	15.7
B 579-3	41	388	94	18.8
792-88	5	488	87	18.0
792-94	5	515	89	19.4
41956	9	407	84	19.1
L.S.D. .05	?	80		1.2

Scab Resistance

From 54 family lines 643 selections from the Chapman Farm 10-hill row plots in 1954 were grown on scab-infested soil on the Aroostook Farm. About 60 percent, or 384 seedlings, showed less than 1 percent of the surface area covered with scab pustules and about 57 percent or 365.

P. I. table 11. Summary of the data observed from the scab tests on Aroostook Farm, Presque Isle, Maine 1955.

Material tested	Total No.	Surface area covered 1/				Type pustule 2/			
		T	1	2	3	1	2	3	4
Seedling varieties	643	384	204	53	2	90	275	275	3
Gr. Mountain check	643	6	386	226	25	0	1	642	0

1/ Surface area covered	2/ Type of pustule
T = Less than 1%	1 = Small, superficial
1 = 1 to 20%	2 = Large but still superficial
2 = 21 to 40%	3 = Large rough pustules
3 = 41 to 60%	4 = Large rough pustules, deeply pitted.

had superficial pustules of types 1 and 2. The Green Mountain checks were in most instances more severely infected than the selections both in area covered and pustule type, as indicated in P. I. table 11.

The 29 seedlings and varieties included in the scab nursery this year in Maine all indicated some scab resistance except B 2887-2, B 3107-17, B 3114-52, and B 3428-8. The data for the 2 replications are given in P. I. table 12.

P. I. table 12. Scab nursery test for 1955 planted in infested soil on Aroostook Farm, Presque Isle, Maine.

Seedling or variety	Replication 1				Replication 2			
	Seedling		Check <u>1</u> / ₂		Seedling		Check	
	Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty
B 2879-4	1	1	2	3	1	2	3	3
B 2887-2	2	3	2	3	T	1	2	3
B 3004-9	T	2	2	3	1	3	2	3
B 3006-22	1	2	2	3	1	3	2	3
B 3107-17	1	2	2	3	2	3	2	3
B 3114-52	T	3	2	3	2	3	2	3
B 3140-36	T	1	2	3	1	2	3	3
B 3170-33	T	1	2	3	1	2	3	3
B 3309-2	2	2	2	3	2	3	3	3
B 3309-4	T	1	2	3	1	2	2	3
B 3309-8	T	2	2	3	T	1	2	3
B 3428-8	1	3	2	3	3	3	3	3
B 3428-29	T	1	2	3	1	2	3	3
B 3428-31	T	1	2	3	1	3	3	3
B 3428-41	1	2	2	3	1	2	3	3
B 3429-11	2	2	2	3	T	1	3	3
B 3453-2	T	1	3	3	1	2	3	3
B 3454-11	1	2	3	3	1	2	3	3
B 3455-2	2	3	3	3	1	1	2	3
B 3456-2	T	1	3	3	1	2	2	3
B 3457-2	T	1	3	3	1	2	2	3
B 3457-4	T	1	3	3	1	2	2	3
B 3458-10	T	1	3	3	T	2	2	3
B 3458-12	T	2	3	3	T	2	2	3
Ontario	1	2	3	3	1	2	2	3
Cherokee	T	2	3	3	1	1	2	3
Menominee	T	1	3	3	T	1	3	3
Plymouth	T	1	3	3	1	1	3	3
Early Gem	T	1	3	3	T	1	3	3

1/ See foot note on P. I. table 11 for class ratings.

The effect of date of planting and harvesting on the degree of scab infection for 3 varieties in duplicated plots was observed this year in Maine. The evidence for one season only indicates that later plantings are more reliable regardless of time of harvest.

Verticillium Wilt Resistance
R. V. Akeley, F. J. Stevenson, and R. Bonde

The 1955 tests for wilt resistance were again planted in infested soil on the Ashby Farm, Caribou, Maine. A total of 302 selections from 24 family lines were planted in 5-hill rows with the susceptible check variety, Cherokee, planted at 25-row intervals throughout the plot. Eighteen seedlings and varieties, mostly parents of the material being tested, were also included in the field test. The results are given in P. I. table 13.

P. I. table 13. Verticillium wilt resistance test, 5-hill plots, on the Ashby Farm, Caribou, Maine, 1955.

Pedigree No.	Parentage	Select-ions tested	Selections infected			Reading based on total hills		
			No.	No.	Pct.	Total	Infected	Pct.
B 3556	B 595-76 x B 24-58	27	18	67		135	49	36
B 3612	(X792-88)x B 1299-15	2	1	50		10	2	20
B 3613	(X792-88)x B 1268-1	10	3	30		50	8	16
B 3614	(X792-94)x B 1268-46	9	3	33		45	5	11
B 3615	(X792-94)x B 1299-15	11	1	9		55	1	2
B 3617	B 1268-1 x (X792-94)	6	4	67		30	7	23
B 3618	B 1268-26 x (X792-94)	30	16	53		150	27	18
B 3619	B 1268-26 x B 1299-15	4	1	25		20	4	20
B 3620	B 1268-46 x B 1299-15	3	3	100		15	7	47
B 3621	B 1268-46 x Katahdin	4	3	75		20	4	20
B 3622	B 1268-46 x (X792-94)	21	15	71		105	35	33
B 3623	B 1299-5 x (X792-94)	38	29	76		190	76	40
B 3624	B 1299-15 x (X792-94)	6	4	67		30	10	33
B 3625	Houma x B 1299-15	22	16	73		110	29	26
B 3626	B 595-76 x B 2067-52	15	8	53		75	26	35
B 3628	(X792-88 x B 2067-52)	18	9	50		90	22	24
B 3634	B 1172-14 x (X792-94)	6	5	83		30	11	37
B 3646	B 595-76 x B 2395-14	16	9	56		80	20	25
B 3647	B 595-76 x B 2968-31	8	5	62		40	7	17
B 3652	(X792-88) x Cherokee	16	9	56		80	20	25
B 3653	(X792-88) x B 2395-14	19	5	26		95	7	7
B 3654	B 779-1 x Katahdin	7	5	71		35	9	26
B 3672	(S. chacoense x Merrimack) x Cherokee	3	2	67		15	8	53
B 3673	B 24-58 x 3 VW-9	1	1	100		5	4	80
Total for 24 family lines		302	175	580		1,510	398	26
Cherokee check		10	10	100		50	36	72
Breeding material		18	6	33		95	11	12

The level of infestation is greater this year than in 1954 if susceptible checks or varieties are compared between the two years. The 1955 growing season was warm and on the dry side which is just the reverse of the growing conditions in 1954. Approximately 42 percent of the seedlings exposed showed no visible indication and 12 of the 18 parents were symptomless. Several combinations of disease resistances were obtained in seedlings also resistant to verticillium wilt.

Date-of-Planting as Affecting Verticillium Wilt

Three varieties of potato were planted at 3 different dates to study the effect of date-of-planting in relation to percentage of verticillium wilt, yield, and percentage of solids in the tubers. The results of this test are given in P. I. table 14. Cherokee planted May 5 showed 81% infection; planted May 15, 71%; and planted May 25, 47%. The different percentages of infection did not affect the yield or the percentages of solids. Katahdin planted May 5 produced the highest percentage of wilted plants found in this variety, but the May 5 planting with 41 percent infection outyielded the May 25 planting with 26% wilt. The date-of-planting had very little effect on the percentage of wilted plants found in the Houma, but the May 5 planting significantly outyielded the May 25 planting. In 1955, date-of-planting seemed to have little or no effect on the yield and dry-matter content of 3 varieties of potato grown on wilt-sick soil. Results in another season might be different.

P. I. table 14. Effect of date-of-planting and verticillium wilt on yield and percentage solids of 3 varieties of potato Ashby Farm, Caribou, Maine, 1955.

Variety	Date planted	Wilt	U.S. No. 1 yield ^{1/}		Solids ^{2/}
			per acre		
		Pct	Bu.	Pct.	Pct.
Cherokee	May 5	81	396	91	17.7
	May 15	71	399	92	18.0
	May 25	47	387	91	18.1
Mean		66	394	91	17.9
Katahdin	May 5	41	505	95	17.1
	May 15	33	477	96	17.0
	May 25	26	429	95	17.4
Mean		33	470	95	17.2
Houma	May 5	21	601	89	18.7
	May 15	10	550	89	18.5
	May 25	19	515	85	19.0
Mean		17	555	88	18.7

^{1/} L.S.D., .05 level, between mean yields for the same variety planted at different dates, 52 bushels per acre.

^{2/} L.S.D. .05 level, between mean percentages of solids for the same variety planted at different dates, .4.

Dates of Seed Cutting

There are several advantages in cutting seed and permitting it to suberize as long a time as possible before planting. Some of them are: More efficient use of labor, lowered transportation costs if seed is to be shipped long distances, and fewer missing hills and less infection from black-leg and other soil-borne diseases if seed is properly suberized.

In 1955 a test was made to study the effects of date-of-seed-cutting on yields of Irish Cobbler, Katahdin, and Kennebec. Seed of these varieties was cut at 4 different dates: February 21, March 21, April 20, and May 20. There were no significant differences in yield in either of the 3 varieties due to the time of seed cutting. The data for this test are given in P. I. table 15.

P. I. table 15. Dates-of-seed cutting as reflected in yield of 3 varieties of potato.

Variety	Date seed cut	U.S. No. 1 per acre	
		Bu.	Pct.
Irish Cobbler	4-20	458	93
Irish Cobbler	2-21	496	95
"	3-21	473	95
"	5-20	518	96
Katahdin	2-21	456	95
"	3-21	444	97
"	4-20	468	96
"	5-20	467	97
Kennebec	2-21	560	97
"	3-21	541	98
"	4-20	546	97
"	5-20	553	97
L.S.D. .05 level		22	

Seed Spacing as it Affects Yields, Tuber set, and Size of Tubers

In 1955, 5 varieties of potato were planted in rows 34 inches apart, at 5 different spacings between plants --8, 10, 12, 14, and 16 inches. The data for this test are given in P. I. table 16. Seed spacing did not affect the yields of Cherokee and Delus significantly, but the yields of Merrimack, Plymouth and Saco were highest for the 8-inch spacing and lowest for the 16-inch. However, the mean number of tubers per hill and the mean weight per tuber increase with the increase in the distance between plants.

P. I. table 16. Seed spacing as reflected in yields, percentage, number of tubers, tubers per hill, and tuber weight of U.S. No. 1's.

Variety	Spacing	Yield per acre		Total plants	U.S. #1 tubers	U.S. #1 tub-ers per hill	U.S. #1 mean tuber wt.
		Total	U.S. #1				
	In.	Bu.	Pct.	No.	No.	No.	Oz.
Cherokee	8	578	93	179	823	4.6	5.26
"	10	566	95	144	717	5.0	5.91
"	12	586	97	120	675	5.6	6.50
"	14	580	96	104	615	5.9	7.07
"	16	538	97	88	579	6.6	6.96
Delus	8	522	98	171	538	3.1	7.27
"	10	518	98	137	486	3.5	7.99
"	12	509	99	118	427	3.6	8.93
"	14	487	98	101	385	3.8	9.48
"	16	473	99	86	362	4.2	9.78
Merrimack	8	536	95	175	759	4.3	5.30
"	10	457	95	139	648	4.7	5.28
"	12	502	97	120	614	5.1	6.12
"	14	465	96	104	534	5.1	6.53
"	16	441	97	87	509	5.9	6.50
Plymouth	8	714	98	180	761	4.2	7.03
"	10	659	98	144	683	4.7	7.23
"	12	631	98	120	608	5.1	7.78
"	14	625	97	104	550	5.3	8.51
"	16	579	98	88	509	5.8	8.52
Saco	8	688	96	175	921	5.3	5.60
"	10	640	96	141	782	5.5	6.13
"	12	629	97	120	689	5.7	6.84
"	14	641	97	104	716	6.9	6.71
"	16	564	97	88	597	6.8	7.07

L.S.D. .05 level between mean yields of spacing with ⁱⁿ the same variety = 50 bu.

Varietal Reaction to Net Necrosis

In 1955, 13 varieties of potato replicated 4 times in randomized blocks were exposed in the field to leaf roll to test them for their resistance to net necrosis. Aphids fed on Katahdin plants infected with the leaf roll virus were placed on each plant in the plot from July 7 to 14. The yield data for this test are found in P. I. table 17. Red Pontiac ranked first in yield but not significantly higher than Plymouth. Saco, Katahdin, and B 605-10 were almost in the same class as Red Pontiac in yield.

The Mohawk variety showed tuber necrosis symptoms in 43.3% of its tubers; Delus was similar with 42.6; and Russet Burbank had 19.5%. The other 11 varieties were either free of tuber necrosis or had less than 2%.

P. I. table 17. Yields^{1/} of 13 varieties of potato exposed in the field to leaf roll to test for resistance to net necrosis.

Variety	U.S. No. 1 yield		Tubers ^{2/}	Net
	per acre		examined	necrosis
	Bu.	Pct.	No.	Pct.
Boone	327	91	285	0.4
Delus	428	99	251	42.6
Katahdin	519	96	351	.0
Merrimack	374	95	347	.0
Mohawk	496	98	290	45.4
Plymouth	526	97	367	6.0
Red Pontiac	576	93	450	.0
Russet Burbank	425	83	415	19.5
Saco	515	94	452	.2
Sebago	417	91	336	.6
B 595-76	361	91	354	.0
B 605-10	524	98	396	1.0
B 926-9	440	94	333	1.8
L.S.D. .05 level	54			

^{1/} Yields of U.S. No. 1 potatoes, 2 inches minimum size.

^{2/} Samples equal total number tubers per replication.

Late Blight Resistance

R. W. Buck, Jr., Lillian Cash, and E. S. Schultz

In 1955, 996 selections involving 103 crosses and 9 selfed lines were inoculated in the field with the common race of late blight. P. I. table 18 shows the results of this test based on readings made on July 28.

The selections (a total of 349) from the crosses B 3673 thru B 3756 and from the selfed line B 1444 were survivors from seedling inoculations made in 1953. Three hundred forty-four of these fell in Class 1; 1 in class 2; and 4 in class 3.

P. I. table 18. Summary of late blight resistance of selections under field conditions, 1955.

Pedigree No.	Parentage	No. select- ions	Late blight classes ^{1/}					
			1	2	3	4	5	6
B 3556	B 595-76 x B 24-58	20		8	8	4		
B 3557	B 606-37 x B 24-58	57	3	17	26	10	1	
B 3573	B 962-32 x (X927-3)	1			1			
B 35-76	B 2946-5 x B 929-32	42		2	8	29	3	
B 3577	B 2946-5 x B 2968-31	27		7	12	8		
B 3580	B 2935-7 x B 3014-10	21		1	3	16	1	
B 3584	B 3014-10 x B 929-32	6			4	2		
B 3585	B 2968-3 x Cherokee	6			6			
B 3593	OB2423-2 x B 929-32	8			2	6		
B 3595	Katahdin x OB 2905-1	7		1	1	5		
B 3596	OB2586-2 x Saranac	3				3		
B 3597	B 991-14 x Saranac	13		2	5	6		
B 3598	B 991-14 x Teton	26		2	5	14	5	
B 3599	B 2935-7 x B 3021-3	11		7	2	2		
B 3602	B 3021-3 x B 929-32	10		1	5	4		
B 3603	Saranac x B 929-32	29		3	12	13	1	
B 3604	Saranac x B 2395-14	20		2	8	10		
B 3605	Teton x B 929-32	43		1	12	26	4	
B 3606	B 355-24 x (X96-56)	6		1	1	3	1	
B 3607	B 355-24 x B 2919-1	4		1	3			
B 3608	B 355-24 x B 3160-12	7		2	5			
B 3610	B 931-2 x (X96-56)	5		1	2	2		
B 3611	B 2919-1 x (X96-56)	12			3	9		
B 3626	B 595-76 x B 2067-52	21			2	18	1	
B 3627	B 606-37 x B 2067-52	22			7	15		
B 3629	B 2067-52 x B 2968-31	13			2	11		
B 3644	B 2395-14 x Earlane	35			8	19	7	1
B 3645	B 595-76 x B 929-32	15			5	10		
B 3646	B 595-76 x B 2395-14	16		5	7	4		
B 3647	B 595-76 x B 2968-31	8		8				
B 3648	B 606-37 x Katahdin	10		3	3	4		
B 3649	B 606-37 x Saranac	5			2	3		
B 3650	B 606-37 x B 2968-31	15		6	4	4	1	
B 3651	B 606-67 x Cherokee	11		5	6			
B 3652	(X792-88) x Cherokee	16			8	7	1	
B 3653	(X792-88) x B 2395-4	19		4	6	7	2	
B 3654	B 779-1 x Katahdin	7		4			3	
B 3672	(S. chacoense x Merrimack) x Cherokee	3		1	1	1		
B 1423	B 929-3 selfed	10		2	4	4		
B 1424	B 2935-7 selfed	4		1	1	2		
B 1425	B 2968-31 selfed	9		5	4			
B 1426	B 2997-9 selfed	2			2			
B 1427	B 3014-10 selfed	3				3		

P. I. table 18 continued

Pedigree No.	Parentage	No. select- ions	Late blight classes					
			1	2	3	4	5	6
		No.						
B 1430	B 991-14 selfed	9		4	2	3		
B 1436	B 2395-14 selfed	4			2		2	
B 1440	B 96-56 selfed	2			1	1		
B 3673	B 24-58 x 3 VW-9	1	1					
B 3674	(X96-56) x Ac 25953	3	3					
B 3676	B 355-24 x Ac 25959	2	2					
B 3677	B 779-1 x 3VW-9	1	1					
B 3679	B 922-3 x Cherokee	1	1					
B 3680	B 922-3 x (X96-56)	1	1					
B 3682	B 922-6 x Ac 25953	11	11					
B 3683	B 922-6 x (X96-56)	13	13					
B 3684	(X927-3) x Ac 25953	5	5					
B 3685	(X927-3) x 3 VW-9	2	2					
B 3686	B 931-24 x Ac 25953	6	6					
B 3688	B 2067-52 x Ac 25949	12	12					
B 3689	B 2067-52 x Ac 25953	12	12					
B 3690	B 2067-52 x 3 VW-9	2	2					
B 3692	B 2919-1 x Ac 25953	8	8					
B 3695	B 3006-22 x Cherokee	3			3			
B 3696	B 3097-16 x Ac 25959	16	16					
B 3697	B B 3114-12 x 3 VW-9	4	4					
B 3698	B 3160-12 x Ac 25953	21	20	1				
B 3699	B 3167-28 x Ac 25959	5	5					
B 3700	Katahdin x Ac 25949	7	7					
B 3701	Katahdin x Ac 25953	1	1					
B 3702	Katahdin x 3 VW-9	2	2					
B 3703	Ac 25949 x Cherokee	5	5					
B 3705	Ac 25953 x Cherokee	9	9					
B 3706	Ac 25953 x Katahdin	5	5					
B 3707	Ac 25953 x Ac 25959	13	13					
B 3708	Ac 25953 x 3 XE-1	1	1					
B 3709	Ac 25953 x HRI-1	5	5					
B 3710	Ac 25953 x (X96-56)	19	19					
B 3712	Ac 25953 x HIT-8	8	8					
B 3713	Ac 25953 x HSO-2	1	1					
B 3715	Ac 25953 x 3ZJ-5	10	10					
B 3716	Ac 25953 x B 355-24	2	2					
B 3717	Ac 25953 x B 922-3	13	13					
B 3718	Ac 25953 x B 2131-3	6	6					
B 3719	Ac 25953 x B 2331-5-	3	3					
B 3720	Ac 25953 x B 2997-9	15	15					
B 3721	Ac 25953 x B 3160-12	3	3					
B 3722	Ac 25953 x B 3167-28	8	8					
B 3723	Ac 25955 x Cherokee	1	1					
B 3724	Ac 25959 x Cherokee	5	5					

P. I. table 18 continued

Pedigree No.	Parentage	No. select- ions	Late blight classes ^{1/}					
			1	2	3	4	5	6
B 3725	Ac 25959 x (X96-56)	6	6					
B 3726	Ac 25959 x B 3160-12	7	7					
B 3727	OB 2586-2 x Ac 25953	6	6					
B 3729	HIS-2 x Ac 25949	12	12					
B 3730	" x Ac 25953	1	1					
B 3731	HIK-2 x Ac 25948	4	4					
B 3732	HRI-1 x 3 VW-9	6	6					
B 3733	HSO-2 x B 355-24	1	1					
B 3734	HTM-1 x Ac 25953	2	2					
B 3736	HTM-1 x Ac 25955	1	1					
B 3737	HTM-1 x 3 VW-9	2						
D 3743	3 VW-9 x Ac 25949	2	1		1			
B 3744	" x Ac 25959	3	3					
B 3745	" x (X96-56)	1	1					
B 3746	" x B 355-24	1	1					
B 3747	" x B 922-6	2	2					
B 3748	" x B 3160-12	5	5					
B 3749	" x B 3167-28	5	5					
B 3750	3ZJ-5 x Ac 25953	7	7					
B 3751	" x 3 VW-9	2	2					
B 3753	3 XE-1 x Katahdin	1	1					
B 3755	" x Ac 25955	3	3					
B 3756	" x 3 VW-9	1	1					
B 1444	Ac 25959 selfed	1	1					
Total		996	351	108	215	288	33	1

1/ Late blight classes

1. No lesions
2. Occasional leaf showing lesions
3. One-half leaves " "
4. Two-thirds " " "
5. All but a few leaves dead
6. All leaves dead.

During September and October 1955, 7,651 seedlings from 26 crosses and 4 selfed lines were inoculated with zoospores from 5 races of Phytophthora infestans. One or both of the parents were immune from one or more of the races of P. infestans.

The seedlings were inoculated while in the seed flat. The data obtained from this test are summarized in P. I. table 19. Of the 7,651 seedlings inoculated 3,401, or 44.5 percent survived.

P. I. table 19. Summary of data obtained from late blight inoculation test of seedlings, 1955.

	<u>Seedlings inoculated</u>	<u>Seedlings infected</u>		<u>Seedlings surviving</u>	
		No.	Pct.	No.	Pct.
26 crosses	6915	3863	55.9	3051	44.1
4 selfed lines	737	387	52.5	350	47.5
	<u>7651</u>	<u>4250</u>	<u>55.5</u>	<u>3401</u>	<u>44.5</u>

Late Blight Resistance

R. E. Webb, E. S. Schultz, Lillian Cash, F. J. Stevenson, and R. V. Akeley

Four varieties, 25 seedling varieties, 2 accessions, and 996 selections from 105 parental combinations, of which one or both parents possessed immunity from the common race of the late blight fungus, were inoculated with the common race of the fungus in the greenhouse. Of the seedlings, 81% were immune. A similar planting in the field in which a blight epidemic was artificially produced with the common race gave similar results during mid-season. In mid-August conditions were favorable for spread of secondary inoculum. However, 294, or 28.6%, of the seedlings were free of infection at the end of the season.

Webb and Bonde found that physiologic races 0; 1; 2; 3; 4; 1,2; 1,3; 1,4; 2,4; 3,4; and 1,2,4 of late blight were present on infected plants growing on the potato dump heap during mid-June.

Virus A

Five hundred and twenty eight seedling varieties of which one or both parents were either graft- or aphid-immune from virus A were infested in the field with virus-A-infective aphids. A tuber from each of 3 hills of each seedling was harvested for greenhouse testing for resistance to virus A. Each seedling was approach-grafted to healthy Green Mountain to determine the seedlings which were susceptible to aphid inoculation. Seedlings which were not infected in the field were approach-grafted to virus-A-infected 41956 to determine those seedlings which were graft-immune from virus A. The results are given in P. I. table 20. Seedlings which did not become infected in the field or were not graft-immune from the virus were planted in the field and infested with viruliferous aphids in 1955 to determine those seedlings which are aphid-immune from virus A. The results are incomplete to date.

P. I. table 20. Reaction of potato seedlings to virus A.

Pedigree	Parentage	Inocu- lated	Mottled	Top necrosis	No symptoms
		No.	No.	No.	No.
B 3427	B 595-76 x Earlane	46	12	24	9
B 3531	B 606-67(Saco) x Earlane	25	3	18	4
B 3471	Chippewa x Katahdin	24	5	8	11
B 3472	Earlaine x B 929-32	42	8	28	6
B 3482	I. Cobbler x Earlane	84	13	55	16
B 3483	" x Cherokee	59	20	21	18
B 1382	Katahdin selfed	87	29	0	58
B 1391	Earlaine "	98	24	59	15
B 1396	B 881-12 "	32	24	0	8
B 1400	Cherokee "	31	14	0	17

Virus X Resistance

Approximately 600 seedling varieties were screened for immunity from virus X. Of the seedlings, 68% failed to become infected by mechanical inoculation with the virulent strain of X. Apparently a high percentage of the seedlings from immune parents may be expected to be immune from the virus.

Virus Y Resistance

Over 2,600 varieties and seedling varieties in 3-hill lots were infested with virus-Y-infective aphids to compare their relative resistance to virus Y with that of Katahdin and Chippewa. Some seedling varieties that had shown some resistance in previous tests were planted as many as 3 times in the plot. Under conditions of the tests all inoculated plants of Katahdin, Chippewa, and Green Mountain (very susceptible) became infected. Only 2 of the 25 accessions failed to contract the disease. Of the 1,750 selections, 777, or 44.4%, failed to show current-season symptoms of virus Y.

A number of parental types gave selections which escaped infection with virus Y in 1955. Seedling varieties B 2067-52 and B 2068-23, selections from Chippewa x B 381-2, did not develop symptoms of infection in duplicate plantings. Both parents became diseased. All 17 inbred lines from B 2067-52 and 17 of 20 inbred lines from B 2068-23 failed to show symptoms. Seventeen selections from the cross, B 2067-52 x B 2068-23, also failed to become diseased. Of 254 selections from parental combinations in which B 2067-52 was one parent, 151, or 59.4%, did not develop current-season symptoms. Katahdin, Katahdin selfed, and ND 457 were other parents which produced progenies that did not become diseased.

Five plants each of 27 selections of Solanum demissum, 7 of S. chacoense, 6 of S. andigenum, 2 of S. antipovichi, and 1 each of S. schickii, S. macolae, and S. parodii, were tested for resistance to virus Y. All selections became diseased. Plants of 3 selections of S. demissum developed necrotic spots on the leaves soon after inoculation and were dead within 10 days.

Verticillium Wilt Resistance Tests

Preliminary results indicate that inoculating potato seedlings at transplanting time with a mycelial and spore suspension of Verticillium albo-atrum will eliminate susceptible seedlings in 3-4 weeks after transplanting. When transplanted 1,585 seedlings, representing 10 parental combinations, were inoculated with the wilt organism; 12% failed to show symptoms. The number of seedlings surviving the tests varied widely between parental combinations. Less than 1% of the seedlings survived in some parental combinations, while 33-39% survived in others. Of 19 selections which survived the test in the spring of 1955, 18 failed to show symptoms after a second inoculation in the fall. Surviving seedlings will be field tested in verticillium-infested soil in 1956.

Inoculating the soil in the seed flats with the wilt organism at planting time did not appear promising as a technique to eliminate susceptible seedlings before transplanting.

Schultz Potato Virus Collection

A collection of viruses causing diseases of the potato is maintained by the Department of Agriculture on Aroostook Farm, Presque Isle, Maine. This collection has been named the Schultz potato virus collection in recognition of the efforts of E. S. Schultz in maintaining the collection over a period of some 30 years. He and Donald Folsom of the Maine Agricultural Experiment Station began the virus collection about 1923 after selecting and identifying a number of potato viruses. With the assistance of Reiner Bonde and W. P. Raleigh, additional viruses were identified and added to the collection. Other viruses of the potato were sent to Dr. Schultz for maintenance. Since 1937 the collection has been maintained largely through efforts of Dr. Schultz.

The collection contains the viruses causing the following diseases of potato: Mild mosaic, crinkle mosaic, rugose mosaic, interveinal mosaic, leaf rolling mosaic, aucuba mosaic, calico mosaic, leaf roll, spindle tuber, unmottled curly dwarf, witches'-broom, apical leaf roll, and yellow dwarf. Two strains of virus A, 5 strains of virus X, 3 strains of virus Y and 4 strains of the leaf roll virus are included in the collection.

Tubers infected with each of the above viruses are available in small quantities to interested research personnel. Address requests to R. E. Webb, Vegetable Crops Section, Plant Industry Station, Beltsville, Md. A letter of authorization for entry from the appropriate State agency must accompany the request.

In 1955, virus cultures from the collection were sent to James W. Guthrie and John G. McLean, Aberdeen, Idaho, W. J. Hooker, Michigan State College, East Lansing, Mich., and R. H. Larson, University of Wisconsin, Madison, Wis. Cultures of 11 viruses were represented in these requests.

Investigation of Solanum Species and Hybrids

R. W. Buck, Jr.

The meiotic behavior of chromosomes has been studied in the microsporocytes of 41 diploid species and clones, of 48 tetraploid species and clones, and of two hexaploid species. The majority of the species were obtained from the Inter-regional Potato Introduction Station Sturgeon Bay, Wis. Cytological investigations of 82 hybrids involving 39 combinations among diploid species, and 17 triploid hybrids from crosses between tetraploid and diploid species have been made.

Three hundred fifty-one different pollinations among diploid species were attempted in 1955. One hundred ninety-one set fruit and 187 produced seed. Sixteen diploid species were pollinated with Katahdin pollen. Seven set fruit and two produced seed. Katahdin pollen was used for 71 diploid interspecific hybrids (31 combinations) and 48 set fruit and 30 produced seed. The chromosome number of these progenies will be determined in search for tetraploid plants which may be used in crossing with cultivated varieties.

Pollinations were made between S. demissum clones possessing immunity to certain specialized races of Phytophthora infestans and diploid species. Seed was obtained from 10 combinations. These progenies are being crossed with S. tuberosum.

Attempts were made to double the chromosome number of diploid species and interspecific hybrids by colchicine treatment. Cytological investigations show that some of the plants possess the double number of chromosomes. Other plants are apparent tetraploids but need further investigation. The crossability of the artificial tetraploids with S. tuberosum is being investigated.

COLORADO (Fort Collins)

Lawrence A. Schaal, Cecil W. Frutchev and Charles McAnelly

The Ft. Collins Seedling Increase and Test Plot

In a test plot 4 miles NE of Ft. Collins, Colo., 136 seedling selections were planted. All lots were planted in tuber units between May 10 and May 15. Harvesting was September 15 to 20. 10-20-0 fertilizer at 250 pounds per acre was applied at planting time. The usual cultivating, irrigating, and dusting with insecticides were carried on during the summer.

Some of the varieties were rogued out when 6" high; others when approximately 12" high. Others were discarded at harvesttime and some again at first sorting in November. Fifty-two were harvested and 41 retained for further testing in 1956. Characters considered in the determination of desirability were: Vine type, vine size, tuber type, tuber quality, skin toughness and disease resistance. Specific gravity was measured in all selections. Chipping quality will be determined after a storage period. Colo. table 1 lists selections that have shown promise in past tests and four recently named varieties. Hill selections were made from several of the best lots and indexed in the Texas winter test plot in 1955-56.

The specific gravity was in general lower than last season in most of the older selections. CS 11888, CS 11889, CS 13091, CS 13178, CS 13240, and CS 13222 were outstanding. None of the older red selections appeared to be especially desirable. CS 13622 was the only one with good red color that appeared desirable. The past season was characterized by high temperatures and general unfavorable growing conditions, yet these selections produced a high quality crop. There is sufficient seed stock of the CS selections listed in Colo. table 1 to permit commercial tests of these lots next season.

A large number of older selections were discarded early in the season since they showed heavy leaf roll infection, indicating severe field infection and susceptibility. Although there was leafroll in older lots, those saved showed a relatively small amount of leaf roll.

Colo. table 1. Seedling and named varieties grown in Fort Collins, Colo., test plot, 1955, saved for increase and larger tests in 1956.

Seedling or variety	Parentage	Dry matter	General appearance
CS 11888	CS 10079 x B 991-3	20.8	Good
CS 11889	" x "	21.6	Good
CS 11918	" x "	21.4	Good
CS 12623	CS 9887 x B 2159-1	17.4	Fair to poor
CS 12969	CS 10087 x US 627-164	19.7	Fair to poor
CS 13035	B 2083-7 x B 927-32	20.8	Good
CS 13091	B 461-31 x B 773-8	21.8	Good
CS 13153	US 627-164 x B 927-32	23.4	Fair
CS 13178	" "	22.0	Good
CS 13222	CS 10082 x B 991-3	22.4	Good
CS 13236	Yampa x B 927-32	19.2	Good
CS 13240	" x "	20.4	Good
CS 13622	B 2159-1 x 381-2	20.8	Good (Red)
Pungo	96-44 x 528-170	19.7	Fair
Delus	Mohawk x 96-56	23.0	Good
Saco	41956 x 96-56	18.6	Poor
Merrimac	96-56 x Saranac	18.6	Fair
B 355-14	" "	19.1	Good
Plymouth	Mohawk x 96-56	20.6	Good
B 2368-4	Pontiac x B 400-1	17.7	Poor
A 131-20	-----	17.7	Poor
Boone	TI-5 x B 231-3	17.7	Good
N 311	-----	21.8	Good

Colorado Seedling Test Plots, 1955
New Seedling Selections

Ninety-two selections from thirty-four family lines were obtained from the 5-hill lot increase plot at the Greeley Potato Experiment Station. These were selected from a larger group as having promise. Hills from these selections were planted in the Ft. Lupton scab and adaptability plot. All material available was planted in tuber units on the Horticultural Farm at Fort Collins, and the number in each lot or selection varied. These selections were rogued several times during the season, and all showing unusual amounts of virus diseases and poor plant types were discarded. Those remaining at or near maturity were hill indexed and will be planted in Texas for disease readings. These again will be rogued and the increase from healthy hills returned to Colorado for summer planting and increase. Colo. table 2 shows these selections, the specific gravity of those retained for further test, and the scab reaction in the Ft. Lupton scab plot.

Colo. table 2. Seedling selections, 1955, saved for further tests in 1956.

Seedling number	Parentage			Tuber color	Dry matter	Scab reading	
						Area scabbed	Pustule type
CS 13829	B 2083-7 x B 927-32			White	19.7	1	1
CS 13859	US 627-164 x B 927-32			"	20.4	1	1
CS 13922	US 627-164 x B 927-32			"	19.4	1	1
CS 13925	" x "			"	21.6	1	1
CS 13928	" x "			"	21.4	1	2
CS 13947	" x "			"	21.2	1	1
CS 13950	" x "			"	20.8	1	2
CS 13951	" x "			"	20.4	2	2
CS 14002	B 61-3 x "			"	20.4	1	2
CS 14025	CS 10099 x "			"	19.4	2	3
CS 14038	" x "			"	20.2	2	2
CS 14065	CS 10085 x "			"	19.7	1	1
CS 14082	" x "			Russet	19.7	1	1
CS 14093	CS 10135 x B 927-32			White	19.2	2	2
CS 14143	Yampa x B 991-3			"	20.6	1	2
CS 14514	13889-42 x CS 9951			-	20.4	1	1
CS 14585	CS 9987 x B 400-1			-	19.2	2	3
CS 14690	B 2159-1 x CS 10585			Red	16.9	2	2

INTER-REGIONAL POTATO INTRODUCTION PROJECT
(Cooperative Project of the 48 states
and the Plant Introduction Section, ARS)

R. W. Hougas and R. W. Ross

New Solanum stocks were introduced in 1955 from 15 foreign countries (Argentina, Australia, Austria, Canada, Chile, Colombia, Costa Rica, England, Germany, Mexico, Netherlands, Paraguay, Peru, Scotland, Sweden). The new stocks, 209 in number, were introduced in accordance with the policy formulated by the technical workers. Most of the stocks requested and introduced carry resistance to one or more of the economically important potato diseases of this country.

Good increase of true seed was obtained in the greenhouse during the spring season. The program of obtaining true seed of the self-incompatible and male-sterile stocks was continued and expanded with good success. This phase of the work has been materially facilitated through application of recently developed methods for the collection and storage of Solanum pollen. The longevity of Solanum pollen is increased considerably when stored in the frozen condition.

Herbarium specimens were prepared, in duplicate, of species introductions grown in the 1955 field. One set of the specimens was sent to Dr. D. S. Correll at Beltsville, Md., for use in his taxonomic study of the tuber-bearing *Solanum* species. Dr. Correll worked at the Potato Introduction Station in late August taking notes on and preparing photographs of the field plantings.

Through the combined contributions of Dutch, Scottish, and American workers the collection now includes the complete set of differential hosts (*S. demissum*-*S. tuberosum* hybrids) for the late blight fungus as initially proposed in "International System of Designating Inter-relationships of Genes and Races". Host genotypes of each of the *Phytophthora infestans* races 1,2,3,4 individually, as well as host genotypes of 11 combinations of the 4 genes, are represented.

Leaf roll is one of the most troublesome virus disease problems in the United States potato production. Promising resistance has been found among certain European varieties and breeding selections. Four varieties and 10 breeding selections which have exhibited resistance in repeated field exposure to the disease were introduced from Scotland. Four leaf-roll-resistant species hybrids involving *S. andigenum*, *S. demissum* and *S. acaule* were introduced from Germany. These selections have been increased and are available to technical workers.

The wild South American diploid species *S. simplicifolium* is known to carry hypersensitivity to potato Y-virus. This species has been successfully hybridized with the commercial potato/Australia. One of the most resistant hybrids from this cross has just been introduced.

Additional bacterial-wilt-resistant selections from backcross generations of *S. andigenum*, *S. tuberosum* have been received from the Netherlands. These selections are currently being increased for distribution. Tetraploid selections of the highly bacterial-wilt-resistant Mexican diploid species, *S. pinnatisectum*, have been added to the collection.

S. rybinii is a diploid species cultivated by South American Indians of the Andean region. Selections of this species have been reported resistant to Y-virus. Most selections have a very short dormancy. Seeds of 46 unevaluated varieties have been received from Colombia through courtesy of the Rockefeller Foundation. These selections are currently being increased.

The tetraploid species *Solanum andigenum* occurs in a considerable array of varieties over a wide geographic area ranging through Argentina, Bolivia, Peru, Columbia, Ecuador, Venezuela, and Mexico. *S. andigenum* is considered the ancestor of the commercial potato *S. tuberosum* of Europe and North America by several investigators. *S. andigenum* hybridizes readily with the commercial potato and the resulting hybrids are quite fertile. This combination of factors, i.e., the innumerable varieties, the wide geographic range and the ease of crossability of this species with the commercial potato, makes *S. andigenum* an unusually promising source of germ plasm for improvement of the commercial potato. The collection presently includes 78 selections of this species, as well as several hybrids with other species. High resistance to the golden nematode and

to southern bacterial wilt has previously been reported among the S. Andigenum stocks of the collection. Other superior characters of this species are reported in the literature and include resistance to ring rot, to late blight, to black leg, and to several viruses. Long stolons and short-day requirement for tuberization are, without doubt, the primary factors which have resulted in rather limited use of this species in improvement of the commercial potato.

An inventory of the *Solanum* stocks in the Inter-regional Potato Collection is presently being assembled. The inventory will contain a detailed listing of stocks and will cite pertinent literature. Copies of the new inventory will be distributed through the mailing list of the project and upon request of interested technical workers.

NORTH CENTRAL REGIONAL POTATO TRIALS, 1955
August E. Kehr and Cooperators 1/

The North Central Regional trials were first established in 1950. This year marks the completion of the fifth season. Potato breeders in this area have agreed that these tests are extremely valuable in obtaining rather complete and rapid evaluation of advanced seedlings which are being considered for possible release.

At the present time there are 8 States active in these trials and in 1955 tests were conducted in all 8 States. However, the tests in Minnesota were destroyed by floods late in the season, and no yield tests are available from there this year. Complete data for yields, defects, and total solids are available from 7 states. Tests will be conducted in 9 States in 1956, Ohio being the additional State.

Environmental Data: The tests were conducted on peat soils in Indiana and Iowa, and on mineral soils in the other 6 states. Fertilizer applications reflect local soil types and local practices. Spacing between the hills and between the rows is based upon local practices. (N. C. table 1).

The earliest planting date was March 31 in Missouri, and the latest was June 21 in Nebraska. Most plantings were made in early May.

Weather conditions were highly variable. The trials suffered from drought in Iowa and North Dakota. The weather in July and August was unusually hot in all areas, but did not affect the Missouri plantings which were harvested July 12.

Yield Data: Based upon total yields of U.S. #1 potatoes none of the entries averaged higher than Red Pontiac, although N.D. 2910-IR was equal to Red Pontiac in yields of marketable size potatoes. Irish Cobbler was outyielded only by N.D. 2910-IR and Mich 1363.

It should be emphasized that the averages computed on all these data are not strictly valid since they do not include the same entries at all locations. Wherever a selection was not grown at all locations the average figures are biased.

Maturity: Maturity varies greatly with location. Varieties in the early group averaging earlier than Cobbler were Triumph and N.D. 457-1-10, and those of the same maturity as Cobbler were N.D. 457-1-16 and Minn. 12. The latest selection in the test was Wis. S₁.55, which was considerably later than Red Pontiac.

1/

Indiana, Dr. N. K. Ellis; Michigan, Dr. N. R. Thompson and Dr. W. J. Hooker; Minnesota, Dr. F. A. Krantz; Missouri, Dr. Victor H. Lambeth; Nebraska, Dr. H. O. Werner; North Dakota, Mr. R. H. Johansen, Dr. W. G. Hoyman, Dr. J. H. Schultz (now deceased); and Wisconsin, Dr. G. H. Rieman.

Percentage Solids: No variety had an average total solids greater than Cobbler. However, probably there are no great differences among any of the selections in the test, with the possible exception that Red Pontiac was consistently lower than any other single entry.

It appears that location has a much greater effect on solids than variety. The range of average solids was greater among locations than among varieties. This fact is becoming increasingly important in potato production.

Scab Resistance: There can be no doubt that Wis. B27.50 was by far the most universally scab-resistant selection. Others with a consistently high degree of scab resistance were Minn. 12, Wis. O 103.51, N.D. 2910-IR, Wis. S1².55, and Mich. 1363. A moderate degree of resistance is found in I 803-3 which scabbed seriously only in Minnesota.

External and Internal Defects: Information reported for external and internal defects varied so drastically from one location to the next that these data seem highly unreliable. It would not seem justifiable to draw many firm conclusions from tables 6 or 7.

<u>Entry</u>	<u>Total merit points</u>	<u>Overall rank</u>
Wis. O 103.51	17	1
N.D. 2910-IR	16	2
N.D. 457-1-16	15	3
I 803-3	11	Tie
Mich. 1363	11	Tie
Minn. 12	8	6
N.D. 457-1-10	7	7
Wis D27.50	5	8

Late Blight: Minnesota reported some data on field resistance to late blight. Under Minnesota conditions the only variety with any degree of resistance to races 1,4 and 2,4 of late blight was I 803-3. This selection is resistant to races 0, and 2,4 of the late blight organism.

Release of Varieties in Test: The variety Wis. D27.50 has already been released and named Antigo. Selection I 803-3 is being presently considered for release.

Overall Merit Ratings: The various cooperators disagreed pretty consistently on the outstanding entry. However, a summary of evaluation places the entries in the following order:

North Central table 1. North Central potato trials, 1955.

Environmental Conditions

	Indiana	Iowa
Cooperator	N. K. Ellis	A. E. Schark
Location	Walkerton, Ind	Clear Lake, Iowa
Soil Type	Peat	Neutral Peat
Fertilizer	1200#/A 0-10-30	900#/A 0-9-27
Spacing	Hills 12", rows 36"	Hills 12", rows 36"
Date Planted	May 3, 1955	May 2, 1955
Date Harvested	Sept. 14, 1955	Sept. 19, 1955
Remarks	Normal rainfall, high temperatures, 9 sprays of Dithane and DDT. Vines killed prior to harvest.	Hail damage in July, extreme uneven rainfall distribution, most of season hot and dry. Bordeaux sprays with DDT at 7-10 days intervals. Vines killed by natural conditions.
	Michigan	Missouri
Cooperator	N. R. Thompson	V. N. Lambeth
Location	Lake City, Mich.	Franklin, Mo.
Soil Type	Iosco Sandy Loam	Menfro Silt Loam
Fertilizer	550#/A 5-20-20 15 tons barnyard manure	350#/A 12-12-12 before plowing 350#/A 12-12-12 broadcast and disked 200#/A 12-12-12 banded at planting 40#/A actual nitrogen side dressed May 11.
Spacing	Hills 11", rows 36"	Hills 12", rows 42"
Date Planted	May 17, 1955	March 31, 1955
Date Harvested	Sept. 15, 1955	July 12-13, 1955
Remarks	13.33 inches rainfall plus 8 inches of irrigation in 4 applications. Weekly sprays of DDT and Dithane (after July 1). Vines killed by roto beating Sept. 13.	Rainfall sufficient, favorable temperature, 2 irrigations of 1½". Sprayed with Zineb and DDT at 10-14 day intervals, lindane at emergence. No vine killing used.
	Nebraska	North Dakota
Cooperator	H. O. Werner	R. H. Johansen
Location	Alliance, Neb. (4000')	Grand Forks, N. Dak
Soil Type	Fine, sandy loam	Beardon Clay Loam
Fertilizer		200#/A 0-30-15
Spacing	Hills 12", rows 36"	Hills 14", rows 38"
Date Planted	June 21, 1955	May 12, 1955
Date Harvested	October 14, 1955	Sept. 16, 1955

NebraskaNorth Dakota

Remarks

May, June, Sept. cooler
than average; irrigations.
Frost Oct. 7 killed vines

Rainfall and temperature normal
in early season, but hot and dry
in latter part of season. No
fungicidal sprays. DDT and Toxa-
phene dusts at regular intervals.
Vines killed Aug. 31 by roto
beating.

WisconsinMinnesota

Cooperator

G. H. Rieman

F. A. Krantz

Location

Rhineland, Wis.

Duluth, Minn.

Soil Type

Sandy Loam

Fertilizer

600#/A 5-20-20

Spacing

Hills 12", rows 36"

Date Planted

May 1955

Date Harvested

Sept. 1955

Remarks

Hot, dry during July and
August. Parzate and DDT
sprays applied. Vines
killed by frost 10 days
before harvest. Yields
about average for region.

4" rain in late season caused
soil rots, making yield data
unreliable. Scab results are
from Grand Rapids and late blight
report from Castle Danger.

North Central table 2. Yields of U.S. No. 1 and percent of total yields which
were U. S. No. 1.

Variety	Ind.		Iowa		Mich.		Mo.		Neb. ^{1/}		N. Dak.		Wis.		Ave.	
	Bu.	%	Bu.	%	Bu.	%	Bu.	%	Bu.	%	Bu.	%	Bu.	%	Bu.	%
Early																
Ia. 803-3	430	86	137	85	333	90	360	96	409	95	85	91	310	91	295	91
N.D. 457-1-16	190	84	295	90	296	90	472	94	504	98	147	93	358	97	323	92
N.D. 457-1-10	311	82	-	-	186	84	415	94	448	98	116	92	339	95	302	91
Wis. D 27.50																
(Antigo)	477	86	160	84	471	91	417	96	504	97	109	97	349	90	355	92
Minn. 12	--	--	77	87	391	90	--	--	347	98	--	--	329	94	286	92
Mich. 13163	563	90	253	91	490	91	442	96	522	96	112	93	358	90	391	92
Triumph	488	73	149	90	--	--	373	98	454	91	85	95	329	87	313	88
Cobbler	424	77	378	90	417	88	451	94	552	96	130	90	310	82	380	88
Late																
Wis. O 103.51	590	90	186	87	332	87	372	96	448	96	121	96	349	92	343	92
Minn. 119	--	--	121	72	381	87	--	--	510	97	--	--	319	87	333	86
N.D. 2910-1R	750	92	231	82	432	84	602	96	526	97	137	97	368	90	435	91
Wis. 51.55	498	77	98	76	268	78	236	86	217	92	60	85	329	87	244	83
Red Pontiac	760	84	263	91	446	91	523	95	518	95	143	98	397	87	436	92
L.S.D. .01	158.6		112		123.9		58.0				64.2		N.S.			
" .05	117.7		83		92.0		43.1				47.7		N.S.			
C.V. %	13.0		34.0		17.2		7.3				14.9		14.4			

^{1/} Computed yield of U.S. #1 size tubers.

North Central table 3. Maturity classifications.

Early group	Iowa	Mich.	Mo.	Neb.	N.Dak.	Wis.	Ave.
I 803-3	2.0	2.3	3	4.0	2.5	3	2.8
N.D. 457-1-16	2.5	2.5	2	3.0	2.0	2.5	2.4
N.D. 457-1-10	-	2.0	2	2.5	1.7	2.5	2.1
Wis. D27.50(Antigo)	2.5	2.8	3.8	3.5	3.5	2.5	3.1
Minn. 12	2.0	2.5	--	2.5	--	2.5	2.4
Mich. 1363	2.5	2.0	2.3	4.5	2.5	2.5	2.7
Triumph	2.0	--	2	1.0	2.0	2	1.8
I. Cobbler	2.5	2.0	2.5	3.5	2.0	2	2.4

Late Group

Wis. O 103.51	3.0	3.5	3.5	4.0	4.5	3	3.6
Minn. 119	4.0	3.3	--	3.5	--	2.5	3.3
N.D. 2910-1R	4.0	3.3	3.3	4.5	4.0	2.5	3.6
Wis. S1.55	4.0	3.5	4.5	3.5	4.7	4	4.0
Red Pontiac	3.0	3.3	3.8	3.5	3.5	3	3.4

North Central table 4. Total solids.

Early group	Ind. Pct.	Iowa Pct.	Mich. Pct.	Mo. Pct.	Neb. Pct.	N.Dak. Pct.	Wis. Pct.	Ave. Pct.
I 803-3	17.1	15.4	17.7	15.2	19.7	19.9	18.2	17.6
N.D. 457-1-16	15.8	15.6	17.3	16.9	18.6	18.8	18.2	17.3
N.D. 457-1-10	16.7	---	16.7	17.7	19.2	19.0	18.0	17.9
Wis. D 27.50(Antigo)	16.7	14.1	16.5	16.5	19.2	18.4	16.7	16.9
Minn. 12	-	15.6	15.6	--	19.4	--	17.5	17.0
Mich. 1363	16.5	16.5	16.5	16.2	21.2	18.0	17.1	17.4
Triumph	16.5	14.8	--	15.4	19.2	20.3	16.5	17.1
I. Cobbler	17.5	17.5	18.2	17.1	21.8	17.7	18.0	18.3

Late group

Wis. O 103.51	16.5	16.7	16.2	16.5	19.4	18.4	17.5	17.3
Minn. 119	--	15.4	15.8	--	19.4	--	18.2	17.2
N.D. 2910-1R	15.8	16.9	15.6	17.3	18.8	19.7	18.4	17.5
Wis. 51.55	17.7	15.4	17.3	15.6	19.4	18.2	17.3	17.3
Red Pontiac	16.0	14.3	15.6	15.2	18.0	16.9	15.0	15.9
Ave. for location	16.62	15.68	16.58	16.33	18.66	18.66	17.43	

North Central table 5. Scab reactions reported.

	Ind.		Iowa		Mich.		Mo.		Neb.		N.Dak.		Minn.		Wis.	
	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.
I 803-3	2	3	T	3	1	2	1	3	3	1	T	1	3	5	2	2
N.D. 457-1-16	1	4	T	4	0	0	2	3	4	5	1	1	5	5	5	3
N.D. 457-1-10	1	4	-	-	1	3	1	3	4	3	1	3	5	5	5	3
Wis. D 27.50																
(Antigo)	1	3	2	1	0	0	0	0	1	3	T	1	3	2	2	2
Minn. 12	-	-	2	2	0	0	-	-	2	2	-	-	2	3	3	2
Mich. 1363	1	3	1	2	0	0	0	0	3	4	1	1	3	2	3	2
Triumph	4	5	1	3	-	-	2	2	4	5	1	2	5	5	4	4
Cobbler	1	5	T	4	1	3	1	3	4	5	2	3	5	5	5	5
Wis. O 103.51	1	3	2	3	1	2	0	0	3	1	1	1	5	3	2	2
Minn. 119	-	-	2	3	0	0	-	-	3	5	-	-	5	5	4	3
N.D. 2910-1R	1	2	3	3	0	0	0	0	3	3	2	3	3	2	4	3
Wis. 51.55	2	3	3	3	0	0	0	0	2	3	2	1	5	3	2	2
Red Pontiac	3	3	1	3	0	0	0	0	3	4	1	3	5	5	5	5

North Central table 6. Average external defects.

Early	Scab	Growth cracks	Second growth	Sun green
	Pct.	Pct.	Pct.	Pct.
Ia. 803-3	23.2	7.8	0.6	3.2
N.D. 457-1-16	35.4	2.4	1.0	2.6
N.D. 457-1-10	21.0	.8	1.5	1.8
Wis. D 27.50(Antigo)	12.4	.8	.4	1.0
Minn. 12	27.5	1.3	.0	.8
Mich. 1363	28.2	.6	1.2	.8
Triumph	39.0	5.2	.8	.7
Cobbler	40.0	.0	2.0	.8
 <u>Late</u>				
Wis. O 103.51	24.6	0.6	0.4	2.0
Minn. 119	55.6	1.4	2.3	2.0
N.D. 2910 -1R	28.0	3.2	2.2	.2
Wis. 51.55	8.2	6.4	2.8	.0
Red Pontiac	29.0	1.4	2.2	1.0

North Central table 7. Percent Internal defects.

	Hollow heart	Internal necrosis	Vas. dis.	Normal tubers
	Pct.	Pct.	Pct.	Pct.
Ia. 803-3	0.2	2.6	9.4	88.0
N.D. 457-1-16	.2	1.4	24.2	75.2
N.D. 457-1-10	.0	1.6	14.0	84.0
Wis. D 27.50(Antigo)	.0	2.6	19.3	78.4
Minn. 12	.0	3.0	11.3	86.0
Mich. 1363	.20	2.8	5.8	91.8
Triumph	.0	0.3	10.0	89.8
Cobbler	1.8	7.0	10.4	83.0
<u>Late</u>				
Wis. O 103.51	0.6	2.0	3.6	93.4
Minn. 119	1.3	9.0	5.3	85.0
N.D. 2910-1R	.6	5.6	9.6	85.4
Wis. 51.55	.6	1.2	6.6	90.6
Red Pontiac	.0	1.2	7.2	91.6

North Central table 8. Merit ratings.

	Iowa	Mich.	Mo.	Neb.	N.Dak.	Wis.	Total merit 1/ points
I 803-3		3		5	3	2	11
N.D. 457-1-16	1	2	2		4		15
N.D. 457-1-10		1				4	7
Wis. D 27.50 (Antigo)	5		5			3	5
Minn. 12				3		1	8
Mich. 1363	2	5	4	4	5	5	11
Triumph							0
Cobbler							0
Wis. O 103.51	3	4	3	1	2		17
Minn. 119							0
N.D. 2910-1R	4		1	2	1		16
Wis. 51.55							0
Red Pontiac							0

1/ Merit points determined as follows:

Merit rating	Merit points
1	5
2	4
3	3
4	2
5	1

PACIFIC NORTHWEST
John G. McLean

Leafroll Resistance Test, Parma, Idaho.

From the severe test of 1954 only 12 surviving lines were replanted in 1955, of which only B 579-3, B 24-58, B 2759-1 and B 2759-5 had survived for 2 years. The 1955 season provided a more severe test than 1954. Commercial fields in the area planted from certified or foundation stocks showed 95% to 100% current-season symptoms at the full-bloom stage.

Only 15 lines of the 114 showed no symptoms by August 2 and by August 31 only 3 lines remained without symptoms. None of the family-line selections of the previous year remained free of symptoms. The only lines which survived the 1955 test were B 24-58, B 2759-5, and B 579-3. These lines are related to B 24-58 which was reported by Webb, Akeley and Stevenson^{1/} to be a symptomless carrier of leafroll. Sequoia, Populair and 41956 were late in showing symptoms.

Verticillium Resistance Test, Rexburg, Idaho.

The trial on sub-irrigated land was hampered by underground water seepage from a large canal near the plot. Under such conditions parts of the test were seriously affected and produced small yields. Highly significant, negative correlations generally have been obtained between Verticillium symptoms and total yield and yield of No. 1 tubers. Correlations which were barely significant were found in 1955.

The variety trial (McLean table 1) illustrates the poor yields and grade obtained except B 137-5, which yielded a high percentage of No. 1 tubers (89%) under adverse conditions and produced a significantly higher yield of U.S. No. 1 tubers than the other varieties in the test.

Of the 86 russet-skin lines in the seedling trial, 35 showed significantly less Verticillium symptoms than did Russet Burbank (1% level of significance). Because of the large variations within the plot, however, only 4 russet lines showed a highly significant increase in yield and U.S. No. 1 tubers. These together with the highest yielding white-skin lines, are listed in McLean table 2.

Weather conditions during 1955 delayed the appearance of Verticillium symptoms following the cold weather of May and June. The continued warm weather of late August and early September produced a rapid decline of susceptible plants, but did not favor tuberization in the very late resistant plants. Many of the later lines produced either few tubers, or a few large, rough tubers.

1/ American Potato Journal 32: 429. 1955.

PCNB Applications at Aberdeen, Idaho.

Pentachloronitrobenzine was mixed with the soil at rates of 0, 7.5, 9.4, 37.5, 75 and 112.5 pounds per acre previous to planting Kennebec seed-pieces. In an additional lot the seedpieces were dipped in 75% PCNB powder in an attempt to produce toxicity. Approximately 150 to 187 pounds per acre of PCNB adhered to the seed pieces.

At the suggestion of Dr. J. D. Menzies, Rhizoctonia and Verticillium readings were made on sample stems from the plots. The results are shown in McLean table 3. Rhizoctonia was controlled with all applications. Significant increases in yield were realized with applications of 7.5 to 75 pounds per acre. It is believed that the increase in yield of approximately 3.2 pounds per plot (46 sacks per acre) was due to the control of Rhizoctonia.

Control of Verticillium wilt symptoms was generally apparent with rates of 75 pounds per acre and above. The decrease in Verticillium symptoms was not reflected in a proportionate increase in yield. This was possibly due to toxic effects of the treatment at rates above 75 pounds per acre.

Scab control as measured by the weight of U.S. No. 1 tubers and weight of scab-free tubers was significant at all rates. Maximum control was general at applications of 37.5 pounds per acre and above.

Growth Regulators and Verticillium Symptoms.

Seed tubers of the susceptible varieties Triumph, Early Gem, and Russet Burbank, and the resistant variety 41956 were treated with growth regulators in early February. Treatment was made by soaking the tubers for one hour in a water solution of naphthaleneacetic acid, indolacetic acid, indolbutyric acid, maleic hydrazide/ester of 2,4-D each at 1000 ppm. Maleic hydrazide and 2,4-D solutions were used at 5,000 p.p.m. for 2 other treatments. Other tubers were treated with maleic hydrazide, 1,000 p.p.m. then 2,4-D 1,000 p.p.m., and the change from 2,4-D to maleic hydrazide at 1,000 p.p.m. concentration was also used.

At planting time all tubers were cut and treated with ethylene chlorohydrin. The Verticillium index readings for the 3 susceptible varieties are shown in McLean table 4. The readings on the resistant 41956 ranged from 0 to 5 so were not included in the analysis.

Highly significant reductions of Verticillium were found with 2,4-D, 5,000 p.p.m., maleic hydrazide at 5,000 p.p.m., and indolbutyric and naphthaleneacetic at 1,000 p.p.m.

An interaction of varieties and treatment was found with 2,4-D at the 5,000 p.p.m. concentration. While a reduction in Verticillium was shown in all 3 varieties, the Russet Burbank index was reduced from 38.3 to 4.7 by 2,4-D at 5,000 p.p.m. More consistent results were found with naphthalene acetic acid on all varieties.

McLean table 1. The Verticillium index, yield, and quality of 4 varieties at Rexburg, Idaho.^{1/}

Variety	Verticillium index	Total yield	Yield of U.S. No. 1	Total solids
		Sx/A	Sx/A	Pct.
B 137-5	67.5	213.4	190.2	21.2
A101-17	26.4	230.9	69.7	19.5
Russet Burbank	83.3	175.8	111.8	21.2
A119-15	75.6	158.3	63.9	20.4
L.S.D. at .05	10.0	N.S.	70.9	
" " .01	15.2			

^{1/} 4 x 4 Latin square.

McLean table 2. Total yield and U.S. No. 1 yield produced by the outstanding Verticillium resistant lines at Rexburg, Idaho.

Line	Parents	Yield		Verticillium index
		U.S. No. 1	Total	
		Sx/A	Sx/A	
<u>Russet skin:</u>				
A170-5	Russet Burbank x B 986-7	403.7	563.4	15.0
A180-24	Early Gem x B 2756-2	267.2	508.2	15.7
A180-26	Early Gem x B 2756-2	386.2	479.2	18.3
A183-8	Early Gem x B 986-7	426.9	519.8	2.3
	Russet Burbank (average)	110.0	176.5	79.0
<u>White skin:</u>				
A104-50	Mohawk x Menominee	380.4	395.0	16.7
B 3093-2	Earlaine x X157-9	403.7	496.6	1.7
B 792-88	41956 x Earlaine	470.5	560.5	1.0

McLean table 3. The effect of pentachloronitrobenzene on disease control and yield of Kennebec at Aberdeen, Idaho.

PCNB per acre	Yield per plot ^{1/}		Scab free per plot		Verticillium index		Rhizoctonia lesions per 10 stems
	Total	U.S. #1 ^{2/}			Symptoms	Stem dis- coloration	
Lb.	Lb.	Pct.	Pct.	Lb.			
0-Control	15.7	8.0	38.0	6.2	39.0	42	35 ^{3/}
7.5	19.3	11.2	49.7	9.6	28.0	72	0
9.4	17.7	12.4	79.0	12.2	20.0	42	0
37.5	18.6	15.8	79.0	14.6	28.0	16	0
75.0	18.4	14.8	77.1	14.2	17.5	11	0
112.5	15.5	15.3	90.2	14.0	18.0	42	0
Seed treatment (150-187)	15.5	15.3	79.3	12.3	12.0	26	0
L.S.D. at .05	2.2	1.4	28.9	4.2	10.0	29	
" .01	10.1	2.3	47.8	6.9	16.6	49	

^{1/} Average of 2 replications, 10 hills each.

^{2/} U.S. No. 1 for scab includes scab-free and trace of scab.

^{3/} Average of 4 girdled stems, 14 stem lesions and 17 stolon lesions per 10 stems.

McLean table 4. The effect of 5 growth regulators applied to the seed tubers on the development of Verticillium wilt symptoms.

Tuber treatment	Verticillium index			
	Triumph	Russet Burbank	Early Gem	Treatment average
Control	76.7	38.3	68.3	61.1
2 4 -D, 1,000 p.p.m.	78.3	40.0	56.7	58.3
2 4 -D, 5,000 p.p.m.	67.7	4.7	34.0	35.4
MH, 1,000 p.p.m.	75.6	48.3	65.0	62.8
MH, 5,000 p.p.m.	43.0	34.0	49.0	42.0
MH, to 2 4 -D, 1,000 p.p.m.	70.0	22.0	58.3	50.1
2 4 -D to MH, 1,000 p.p.m.	75.0	27.7	71.7	58.1
Indolbutyric, 1,000 p.p.m.	58.3	23.7	47.0	43.0
Indolacetic, 1,000 p.p.m.	73.3	35.0	65.0	57.8
Napthaleneacetic, 1,000 p.p.m.	46.7	24.0	35.0	35.2
Variety Average	66.4	29.8	55.0	
L.S.D. at .05	Varieties 5.7	Treatments 10.4	Tr. x Var. 18.0	
" .01	7.6	13.9	24.1	

Analysis of total yield and yield of U.S. No. 1 tubers produced no significant differences. No correlation was found between the control of Verticillium symptoms and yield.

SOUTHERN PROJECT
(Louisiana Headquarters)
T. P. Dykstra

The 1955 growing season was disastrous for the potato crop in Louisiana and Alabama. On January 13, 56 of the best of our most recently developed seedlings were planted in a replicated yield plot at Baton Rouge under ideal conditions. Two days later 13 inches of rain fell and additional intermittent rains occurred. This was followed by a rapid drying period resulting in the development of a hard crust on top of the soil, and then more excessive rain. By that time the seed pieces were moldy and slimy; 95% of the seed pieces rotted.

A second planting was started in the middle of February at Baton Rouge and New Roads, La. On March 22 a killing frost occurred and on March 26 the temperature dropped to 28°F. Some time preceding this and several weeks following it, or a total of 6 weeks, no rain fell. At digging time most of the tubers were rough, and the yield was so low that all records obtained were meaningless. The seedlings planted in a yield plot at Fairhope, Ala., suffered a somewhat similar fate, when on March 26 the temperature dropped to 25°F.

More reliable yield and performance records were obtained on seedlings planted at Homestead and Hastings, Fla.; Charleston, S. C.; Weslaco, Tex.; Crossville, Tenn.; and State College, Miss. (See under State headings in table 1.) Table 1 shows the comparative yield records of some of the same seedlings planted in 1954 and 1955. In practically all cases a much lower yield was obtained from the same seedlings in 1955 than in 1954. This difference perhaps can be explained partially by the fact that in 1954 growing conditions at the Cumberland Plateau Experiment Station, Tennessee, where the seed for the 1955 spring crop was grown for increase, was most unfavorable. Since the middle of June 1954, temperatures in excess of 100°F., combined with drought, prevailed during the remainder of the growing season. Most of the seedlings died prematurely, and tubers were kept in the hot dry soil for some time before digging.

Ideal growing conditions prevailed at Crossville, Tenn., where the seedling increase plots are planted. Cool weather and sufficient moisture favored abundant flowering of most of the seedling varieties. Pollination was very successful and more seed balls were harvested than ever before from those crosses made in the field.

The method of collecting and storing potato pollen developed by J. R. King and published in the January issue of the American Potato Journal, Vol. 32, 1955, has proved to be indispensable in successful potato crossing for the Southern program. In the Northern States, pollen can be collected easily from flowers growing in the field by the simple procedure of tapping individual stamens on the thumbnail. This causes the pollen to be readily released

Dykstra table 1. 1954 and 1955 yield records of U.S. No. 1 tubers in bushels per acre, obtained from seedlings planted in different locations. Upper line of each seedling represents the 1954 yield; the lower line 1955 yield. On account of crop failure 1955 Louisiana and Alabama yields are not recorded.

No.	Parentage	Yield U.S. No. 1 tubers per acre at:							
		Hastings, Fla.	Charles- ton, S. C.	Cross- ville, Penn.	Fairhope, Ala.	Honestead, Fla.	Stark- ville, Miss.	Baton Rouge, La.	Weslaco, Tex.
		Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
1354	Pontiac x 92-36-5					259			171 132
1396	176-26 x 179-26					337 168	143		191 100
1859	Pontiac x 96-56				257			280	
		243	214			336	108		131
2988	96-56 x Sebago	308 243							159 29
3266	TI5 x B355-24	188	350 128	87					
3546	Ultimus xB381-2								152 49
3674	B446-54 x Teton	290 254	555 244				25		
3769	Kennebec x B522-33	410 210		303			62		200
			424						35
3865	I910-Bx 182T	275							154
3953	B76-23 x 157-9	340 153	490 128	159			49		86
3962	B76-23 xB445-41	366 58		97					42
			113						
3972	Pontiac x B400-1				223	376 76	100 29	303	147 135
									125
4101	96-56 selfed	285		161					
			158						73
4112	Kennebec selfed				222			347	
		294	278						

Dykstra table 1 continued.

No.	Parentage	Yield U.S. No. 1 tubers per acre at:								
		Hastings, Fla.	Charles- ton, S. C.	Cross- ville, Tenn.	Fairhope, Ala.	Homestead, Fla.	Starks- ville, Miss.	Baton Rouge, La.	Weslaco, Tex.	Savannah, Ga.
		Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
4145	C 8859 x C 7702					240 65			40	192
4190	C 7724 x B 400-1					272				
4399	B 56-11 x 381-2					129			175	
4409	TI5 x B 355-24			131			65	423		
4422	B 56-9 x B 381-2				236	96	124	217	146 54	131
4426	B 76-43 x 96-56	272		156						45
			218							
4429	B 608-56 x B 580-20	259	510 244				85	240		
4454	B 446-54 x Teton	127	289	230 304						140
4735	Kennebec x B 922-3	230 119		136					70	

from the stamens. This procedure does not work in the South, because of high humidity or other climatic conditions, so practically no pollen is obtained by this method. Scarcity of pollen has been the greatest handicap in the southern potato-breeding program. This has now ceased to be a limiting factor. Since King's technique has been practiced an over abundance of pollen is always available.

In most of the potato-growing areas in the South, a red-skin variety is preferred, and the main objective continues to be the development of desirable red varieties resistant to one or more diseases. In the past, all disease resistance was found in white varieties, and it was necessary to make crosses between whites and reds. Progenies of these crosses, although often resistant to diseases,

were generally of an undesirable color and for that reason could not meet the requirements of the trade.

Now a number of fertile disease-resistant reds of a desirable color are available and these are used as male and female parents. As a result, the selections from crosses made during the last few years have a more brilliant red skin than the ones selected in the past.

Selections from the latest developed red seedlings, as soon as available, have been sent to different State cooperators for evaluation. For a number of reasons this has not been too satisfactory. Our procedure now is to plant the latest developed red seedlings only in yield plots in 3 different sections of Louisiana, where they can be observed often for their main characteristics. An irrigation system has recently been installed at the Experiment Station at Baton Rouge in the field where the plots are located. This will eliminate crop failures on account of drought. Only the seedlings that are outstanding in their performance will be shipped to cooperators for additional testing.

In addition to the southern cooperators who are primarily interested in red varieties, a number of cooperators want to test only white seedlings. Since growing conditions at Crossville, Tenn., correspond fairly close to those of other white potato-growing areas in the South, white seedlings for cooperators can be selected satisfactorily in Tennessee, and this practice will be continued.

A source-of-seed test was started this spring in a number of Southern States. In order to eliminate as many varying factors as possible, an identical lot of disease-free North Dakota-grown seed of Triumph and LaSoda varieties was obtained. About 1/3 bushel of each of these 2 varieties from this source was planted for increase in the spring of 1954 in Nebraska, North Dakota, and at 2 different elevations in Colorado. Replicated yield plots planted with seed obtained from the 4 different growing areas were planted in replicated yield plots in the spring of 1955 in Homestead, Fla., Weslaco, Tex., Fairhope, Ala., and at Baton Rouge, La. These tests will be continued for 4 years.

U. S. - Colorado Potato Field Station (Greeley, Colo.)
W. C. Edmundson

Potato-breeding studies for 1955 consisted of breeding for scab resistance with good cooking quality, with both red and white varieties. Some of the parent material was supplied from Beltsville; to this was added the most promising scab-resistant lots developed at Greeley. Many of the parent lots were selected because of their high specific gravity.

The 1955 tests included the first-year seedlings in family lines, second-year seedlings in 5-hill lots, increase lots in 32-hill and 100-hill lots, older seedlings tested on a field basis, and yield test of seedlings. In addition to the test plots at the Station, seed of all lots planted in the 32-hill plots and extra increase lots was supplied to the Colorado A & M College for testing in other parts of the State. The same lots were also supplied to L. A. Schaal for scab-resistance studies.

The growing season of 1955 was very unfavorable for potato production. The yield per acre was below normal, and the quality of the crop was not good. The specific gravity of all seedlings and varieties tested at the Station in 1955 was low. The weather for the most part was hot and dry. Irrigation water from streams and reservoirs was scarce and many irrigation wells were low in the Greeley district. From March 1 to August 1 4.47 inches of rain was recorded at the Station. No late blight was noted at the Station, but early blight was observed in all plots although 4 sprays and 1 dust were applied. Dieldrin was applied to the soil after planting for control of potato flea beetles. Very little flea-beetle injury was observed on the tubers of any of the seedling plots. However, flea-beetle injury is generally less severe in dry seasons than in wet ones. Psyllid yellows was noted in the plots late in August. However, the psyllid population was low according to counts made in the check plot of the spraying experiment.

The 1955 family lines were planted May 11 and irrigated after planting because of the dry conditions of the soil. Family lines planted the middle of May gave better results than those planted the first week in June, as has been the practice. The early planting gave larger tubers. A large number of white seedlings were selected at harvesttime for planting in 1956. A large number of dark red seedlings were selected, as the type and color were exceptionally good this year. About 1,005 of the 1955 seedlings were selected for testing in 1956.

In the test of second-year seedlings, 844 were planted in 5-hill lots. Owing to the difficulty of making selections at harvesttime, a large number of seedlings were retained for a more careful examination. These lots have been re-examined, and all lots showing scab infection and those indicating a tendency to growth crack or having other objectionable features were discarded. All lots that were retained for further tests will be planted on a tuber-unit basis in 32-hill lots at the Station in 1956. These lots will be tested for

scab resistance in infested soil. The remaining tubers of each lot were retained and will be tested by means of the staff of Colorado A & M college.

Of the older seedlings 201 were planted in 32-hill lots on a tuber-unit basis. All lots were retained at harvesttime for closer study. All lots were weighed later and carefully examined for type, scab, growth cracks, second growth, and other defects. Specific gravity readings were made of all lots retained for future tests. The lots retained will be tested also at different locations by State cooperators. Forty-five seedlings were planted in 100-hill lots. Thirty-seven of the older seedlings were planted in half-row or in full-row 540-foot plots. These lots were planted also on a tuber-unit basis. Seed from 41 crosses was planted in the greenhouse August 5. About half of the lots were from crosses made last spring in the greenhouse and the other half was seed produced the previous year. Seed of most lots produced in the greenhouse last spring germinated fairly uniformly, and only a few days later than the year-old seed. The seedlings were potted the first week in September. Seed from 14 crosses in which red parents were used were included in the plantings. A list of red-parent crosses, together with the number of dark-red, medium-red, light-red, and white tubers produced, is given in Edmundson table 1.

Edmundson table 1. Red crosses for 1956 family lines, Greeley, Colo.

Cross No.	Parentage	Dark red	Medium red	Light red	White	Total
28	CS 10999-R x B 381-2R	18	50	284	23	375
29	B 381-2R x CS 12623-R	15	57	147	25	244
30	CS 12621-R x "	10	30	118	9	167
31	B 381-2R x CS 12621-R	6	7	142	84	239
32	B 2337-2R x "	4	15	81	47	147
33	CS 11001-R x CS 12623-R	13	37	71	17	138
34	CS 11012-R x "	25	19	79	4	127
35	B 2162-18-R x CS 10999-R	7	10	84	4	105
36	CS 11002-R x B 2162-18-R	3	23	95	30	151
37	B 2368-11R x B 381-2 R	4	6	63	11	84
38	CS 10585-R x CS 10999-R	8	11	67	2	88
39	CS 12621-R x B 2368-11R	3	7	37	7	54
40	CS 7724-R x CS 10999-R	0	7	59	11	77
41	CS 12558-R x CS 12623-R	11	17	49	7	84
Total		127	296	1376	281	2,080

Twenty-eight seedlings and varieties were included in a yield test plot, which consisted of 25-hill lots randomized and replicated 5 times. The tubers were graded for sizes above and below 1 7/8 inches in diameter. Tubers from each of the 5 replications were used to determine the specific gravity of each seedling or variety. The data for yield, specific gravity, and dry matter are given in Edmundson table 2. The starch content was low in most all lots included in the yield test this year.

Edmundson table 2. Yield test, Greeley, Colo., 1955.

Variety	Mean total yield per acre	Mean per acre above 1 7/8"	Mean specific gravity	Dry matter
	Bu.	Bu.		Pct.
B 73-3	441	304	1.0763	18.9
CS 10060	519	412	1.0766	18.9
CS 10670	501	422	1.0713	17.9
CS 11002	507	365	1.0790	19.4
CS 11012	538	413	1.0819	20.1
CS 11504	426	299	1.0836	20.4
CS 11591	468	366	1.0919	22.1
CS 11726	522	387	1.0847	20.6
CS 11730	543	343	1.0855	20.9
CS 11833	474	339	1.0608	15.7
CS 11857	531	363	1.0797	19.6
CS 11863	583	473	1.0770	19.1
CS 11888	536	469	1.0749	18.4
CS 11889	450	387	1.0759	18.9
CS 12083	469	283	1.0775	19.1
CS 12109	494	388	1.0845	20.6
CS 12132	395	279	1.0764	18.9
CS 12240	527	357	1.0826	20.1
CS 12268	365	248	1.0678	16.9
CS 12288	508	398	1.0725	18.1
CS 12368	330	239	1.0883	21.4
CS 12529	424	332	1.0710	17.6
CS 12623	463	326	1.0748	18.6
Saco	595	494	1.0865	21.1
Delus	393	368	1.0860	20.9
Merrimack	356	281	1.0889	21.6
Katahdin	637	592	1.0815	19.9
Triumph	524	453	1.0705	17.6
L.S.D. at 5%	28.4	24.8	0.0016	
" at 1%	38.4	33.4	0.0022	

ALASKA
C. H. Dearborn

Notes on Newer Potato Varieties

The following named potato varieties and nine numbered selections were tested in Alaska in 1955 for the first time. The varieties were Delus, Osage, Pungo, Redglo, Red LaSoda and Rushmore. Delus had a dry-matter content of 18.9%, developed second growth, and showed discoloration in the cortex near the stolon. Osage produced oblong, uniform tubers with a dry matter of 17.7%. The tubers of Pungo showed growth cracking, deep eyes, a dull skin and 17.2% dry matter. Redglo was unsightly because of the very deep eyes and stolon cavity. Some vascular straining occurred in the stolon area. It contained 15.7% dry matter. Red LaSoda produced large, rough tubers subject to both shatter bruising and growth cracking. The dry-matter content was 16.2%. Rushmore developed large, long flat, curved tubers with very prominent eye-brows. Its shape resulted in many good tubers slipping between the grader rolls and falling into U.S. No. 2 grade. The variety contained 16.5% dry matter. For the purpose of comparison, Green Mountain produced 17.2% dry matter. This would be considered low for Green Mountain in this region.

Of the nine numbered selections bred for scab resistance in Iowa, (I) 803-3, (I) 901-4, (I) 912-6, (I) 915-4, (I) 957-1, (I) 1034-3, (I) 1107-3, (I) 1129-5 and (I) 8140-1, (I) 1107-3 and (I) 1129-5 developed large, deep scab lesions. Number (I) 1129-5 produced an attractive tuber with a dry-matter content of 18.6%.

Frost Resistance

In testing potatoes for adaptation in several regions of Alaska, 114.42-3-44 and 43.47-10-50 have been found to be unusually susceptible to frost injury in August. Cobbler is the only parent common to both seedlings. These seedlings should be valuable as indicators in the frost hardiness studies.

Response to Weed Killer

During a study of quack grass control it was observed that Dalapon bleached the color from pigmented flowers to such an extent that flower color could no longer be used to differentiate varieties. This could be a real handicap to one attempting to rogue for trueness to type. Tuber color was modified only slightly.

Nutritional Problem

A leaf disorder of Arctic Seedling potato has been tentatively attributed to improper nutrition. The first symptoms are usually visible 4 to 5 weeks after emergence or later. Symptoms first appear on plants growing on shallow soils that have been heavily fertilized (80N-320 P₂O₅-80 K₂O). Dwarfing of the vines, particularly from the apical buds back to the middle of the plants, is an early sign. Interveinal chlorosis and necrosis always begins on the intermediate aged leaves and spreads toward the top of the plants. Pin-point necrosis follows chlorosis, but may or may not coalesce to form large dead areas. Margins of affected leaves roll toward the mid-rib, and entire leaves dry crisp. Upward rolling of the leaves proceeds over a period of 2 to 3 weeks, and in severe cases the potato plants die. The plants have the appearance of having been scorched with flame. Leaf characteristics show no evidence of carbohydrate accumulation, but rather a loss of food reserves.

Observations thus far indicate that the disorder may be associated with high soluble salts of iron, aluminum, copper and nitrogen. It has been observed that the leaf burn is mild or non-existent on plants in that portion of a row that runs across a burned stump row. Symptoms of manganese deficiency have been observed and photographed on potato plants in commercial fields in the Matanuska Valley.

AUSTRALIA (New England Expt. Farm)
Glen Innes N.S.W.
R. J. Jessup, Agronomist

The following report consists of excerpts from a letter to F. J. Stevenson from Mr. Jessup and is included in this Annual Potato-Breeding Report by permission of the latter. The excerpts from the letter follow: "I have only recently started on the Potato-Breeding Program, and as I am the only worker actively engaged in the field in New South Wales, I have had a rather busy time, and of course, I have not yet got into the swing of it properly. My crossing program has, up till now, been entirely dependent on external atmospheric conditions, and as a result, many failures have been experienced. At the moment my main pollen parents are Katahdin, Sequoia, Saranac, Courtland, our own varieties Adina and Awaba, and 11-79, a seedling produced by Dr. Hutton of Canberra. It has Snowflake, Katahdin, and U.S.D.A. seedling 41956 in its parentage and has resistance to virus X and a localised reaction to virus Y. The program is conducted in much the same way as most of yours, emphasis being placed in the first year on agronomic characters. About 10-15 thousand seedlings are grown every year without any screening for disease resistance. Together with 500 or more second and third year and more advanced seedlings. About 20 other variety trials are grown in the most important potato growing districts. These are on a smaller scale, and are supervised by our District Agronomists.

Cooking tests are generally carried out each year, and this year I also organized a rough preliminary trial for storage qualities. Also this year I have initiated a trial to determine the effect of spacing on resultant tuber size.

"During the last few years, scab resistance trials have been carried out by the Biology Branch of our Department. In these trials, U.S.D.A. introductions Menominee and Ontario have always shown resistance of a high order, as well as reasonable agronomic characters. Cherokee has not yet been tested."

CALIFORNIA
Glen N. Davis

Potato experiments were conducted in Kern, San Benito, and Siskiyou Counties during 1955.

The work in Kern County consisted of the usual variety adaptation and yield test plot and a plot to test varieties and seedlings for resistance to scab. The yield data are presented in Calif. table 1. Only a single variety, Sequoia, produced a significantly higher yield than the check variety White Rose. A number of varieties were significantly lower in yield than the check.

Calif. table 1. Potatoes, Kern County yield test, 1955.

Variety	5 replications mean Lb.	Specific gravity	Solids Pct.
White Rose ck	38.4	1.087	21.2
Sequoia	42.8	1.093	22.4
Ontario	38.2	1.091	22.0
Saco	37.2	1.091	22.0
Merrimack	32.4	1.095	23.0
Cherokee	35.4	1.091	22.0
Sebago	38.2	1.089	21.6
Early Gem	26.8	1.073	18.2
Russet Burbank	27.8	1.092	22.2
Kennebec	40.0	1.086	21.0
Menominee	39.6	1.093	22.4
Katahdin	38.6	1.090	21.8
Pontiac	24.6	1.069	17.4
Delus	27.6	1.098	23.5

L.S.D. 5% 3.6 lbs. (between means)

" 1% 4.8 " " "

The data from the scab test plot are presented in Calif. table 2. For the first time in 17 years some really promising resistant material was isolated. Red seedlings 3457-2, 3456-2 and 3458-12 produced tubers which were 100, 95.6, and 91.1% marketable, respectively. 3457-2 tubers were well colored and absolutely free of scab lesions. The lesions which did appear on seedlings 3456-2 and 3458-12 were superficial. All three are to be included in the 1956 yield test and planted in the scab test plot.

Calif. table 2. Test plot for scab resistance, Kern County, 1955.

Kind	No. tubers	No. tubers in class rating								Ave.	Mkt. Pct.
		0	1	2	3	4	5	6	7		
White Rose ck.	82	0	5	21	27	19	5			3.8	12.1
B 3457-2	48	277	20	1						.4	100.0
B 3456-2	46	20	17	7	2					.8	95.6
B 3458-12	45	12	29	4						.8	91.1
B 3114-52	33	0	22	7	3	1				1.2	87.8
B 3004-9	41	4	21	10	6					1.4	85.3
Osage	36	0	25	7	4					1.4	88.8
B 3457-4	54	3	26	16	9					1.5	83.3
B 3455-2	40	2	21	8	7	2				1.6	77.5
B 3428-29	42	5	15	13	8	1				1.6	78.5
Ontario	54	6	24	9	5	10				1.8	72.2
B 3309-4	31	3	11	10	4	3				1.8	77.4
B 3429-11	45	5	14	15	7	4				1.8	75.5
B 3453-2	59	0	17	27	13	2				2.0	74.5
B 3006-2	73	0	14	23	22	8	6			2.6	50.6
B 3170-33	31	0	3	13	11	4				2.5	51.6
B 3458-30	52	0	9	13	20	10				2.6	42.3
B 3428-41	75	0	8	22	26	17	2			2.7	40.0
B 3458-3	50	0	5	17	17	11				2.7	44.0
B 2879-4	24	0	4	4	9	7				2.8	33.3
B 3309-2	40	0	3	11	14	9	3			2.9	35.0
B 3140-36	34	0	1	8	18	7				2.9	26.4
B 3428-31	48	0	4	12	11	20	1			3.1	33.3
B 3309-8	23	0	0	3	4	16				3.5	13.0
B 2887-2	26	0	0	1	2	16	7			3.7	3.8
B 3017-17	46	0	1	8	6	13	17			3.8	19.5
B 3428-8	43	0	0	1	2	16	12	12		4.8	2.3

Key to classes of scab:

- 0 = free from scab
- 1 = 1% surface area covered with scab.
- 2 = 5% " " " " "
- 3 = 15% " " " " "
- 4 = 25% " " " " "
- 5 = 35% " " " " "
- 6 = 60% " " " " "
- 7 = 90% " " " " "

Size of plot = 0.01 acre

Fertilizer = ammonium sulphate at 600 lbs. per acre.

The varieties White Rose, Osage, and Ontario were included in the scab plot. Osage appeared the best, producing 88.8% marketable tubers and White Rose the poorest with only 12.1% of the tubers marketable.

The primary objective of the potato work in San Benito County is to isolate a variety with high resistance to Verticillium wilt that has high specific gravity and good chipping quality. The screening of existing varieties resulted in wide use of the variety Kennebec, but this variety is not considered the final answer to the problem. In 1955 a single named variety, Russet Burbank, was included in the plot as a check.

The rest of the material consisted of 28 seedlings supplied by John McLean from his Verticillium-resistant material at Aberdeen, Idaho, and one seedling from Washington State. Several of the seedlings included in the 1955 plot were repeats which looked promising in 1954. The amount of seed stock available of the different seedlings was variable so no uniform replicated plot could be planted. As a result, no statistical analysis was practical. Data on yield and specific gravity from the San Benito plots are given in Calif. table 3. Chipping tests will be run on 5 varieties which looked promising in the field.

Calif. table 3. Yield test, potatoes, San Benito County, 1955.

Kind	Mean yield per replication		Specific gravity	Solids
	Lb.	No.		Pct.
Russet Burbank ck.	16.4	4*	1.080	19.7
101-17	31.6	4*	1.089	21.6
102-18	22.0	2*	1.093	22.4
104-1	38.9	4*	1.085	20.8
104-50	27.6	3*	1.082	20.2
115-9	27.7	1*	1.088	21.4
116-4	25.7	1*	1.074	18.4
116-13	28.2	1*	1.084	20.6
116-30	19.1	10*	1.088	21.4
116-35	15.5	2*	1.084	20.6
116-119	18.2	2*	1.075	18.6
116-127	35.2	1*	1.085	20.8
116-164	38.7	2*	1.091	22.0
119-1	15.1	1*	1.079	19.4
119-5	24.0	1*	1.089	21.6
119-8	19.6	3*	1.094	22.7
120-1	24.3	1*	1.090	21.8
124-15	18.9	1*	1.083	20.4
124-60	26.9	1*	1.072	18.0
124-62	15.0	2*	1.064	16.3
W137-5	19.9	3*	1.073	18.2
163-6**	6.4	10+	--	--
163-10**	3.7	10+	--	--
167-3	15.2	10+	1.069	17.4
170-5	16.0	10+	1.081	19.9
173-2	19.1	10+	1.070	17.5
173-9**	8.1	10+	--	--
173-10**	8.4	10+	--	--
183-7**	10.4	10+	--	--
186-1	13.4	10+	1.062	15.7

(continued)

Calif. table 3 continued

* No. of replications of 25 hills each.

+ No. of hills where seed was not sufficient to plant a replicate.

**Not enough to determine specific gravity

Size of plot = 0.1 acre.

Fertilizer = ammonium sulphate at 600 lbs. per acre

In addition to yield data in San Benito County, readings on decline of the plants due to Verticillium wilt were made at weekly intervals from September 2 until October 18. These data are presented in Calif. table 4.

At Tulelake 14 varieties were planted in a replicated yield plot. The potato plants were severely frosted 2 different times after emergence, resulting in almost complete loss of stand in some varieties. The experiment could more likely be used as a test for frost resistance than a yield test. Some potatoes were recovered from each variety planted and these will be used in chipping tests. The yield data, although valueless as such, are presented in Calif. table 5. Obviously, no attempt at statistical analyses was made.

Calif. table 4. Decline of potato plants in San Benito plot expressed as percentage of total number of plants per kind.

Kind	Healthy plants at 6 dates					
	9/2	9/12	9/20	9/27	10/4	10/18
	%	%	%	%	%	%
Rus. Burbank ck.	85	60	25	0	0	0
101-17	100	100	95	60	33	0
102-18	100	100	100	100	90	30
104-1	100	100	100	90	65	0
104-50	100	100	90	65	25	0
115-9	100	100	100	100	60	0
116-4	90	65	10	10	0	0
116-13	100	90	60	20	0	0
116-30	100	100	100	90	20	0
116-35	90	65	20	0	0	0
116-119	100	70	10	10	0	0
116-164	100	100	95	95	75	35
119-1	40	30	20	20	0	0
119-5	100	100	80	50	10	0
119-8	100	100	65	35	7	0
120-1	100	100	90	40	0	0
124-15	70	20	0	0	0	0
124-60	100	85	50	10	0	0
124-62	90	60	5	0	0	0
163-6	80	30	0	0	0	0
163-10	60	20	5	0	0	0
167-3	100	70	60	40	0	0
170-5	100	100	70	10	0	0

Calif. table 4 continued.

Kind	Healthy plants at 6 dates					
	9/2	9/12	9/20	9/27	10/4	10/18
	%	%	%	%	%	%
173-2	100	90	80	30	20	0
173-9	70	70	10	0	0	0
173-10	100	80	20	20	0	0
183-7	80	20	10	5	0	0
186-1	100	85	30	10	10	0
W.S. 137-5*	100	100	60	35	25	0

* Seedling from Washington State

Calif. table 5. Potato variety yield test, Tulelake, 1955

Kind	Yield in pounds						Sp. gravity	Solids
	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5	Mean		
Rus. Burbank	26.0	24.0	19.0	18.0		21.8	1.069	Pct. 17.4
W137-50	14.0	22.0	16.0	18.0		17.5	1.074	18.4
Sequoia	16.0	16.0	16.0			16.0	1.057	14.7
Katahdin	11.0	20.0	14.0	14.0	17.0	19.0	1.067	16.9
Pontiac	5.0	7.0	7.0			6.3	1.055	14.3
Sebago	13.0	17.0	16.0	14.0		15.0	1.058	14.9
Cherokee	9.0	19.0	8.0	9.0	19.0	12.8	1.080	19.7
Early Gem	13.0	10.0	14.0	16.0	12.0	13.0	1.069	17.4
Kennebec	15.0	12.0	15.0	2.0		11.0	1.065	16.5
Delus	19.0	19.0	7.0	19.0	18.0	16.4	1.079	19.4
Saco	29.0	27.0	18.0	21.0		23.7	1.076	18.9
White Rose	9.0	15.0	10.0	11.0		11.2	1.056	14.5
Merrimack	18.0	20.0	21.0	21.0	25.0	22.5	1.070	17.5

Size of plot = 0.10 acre

Fertilizer - ammonium sulphate at 600 lbs. per acre.

CANADA

Horticultural Division, Experimental Farms Service, Department of
Agriculture, Ottawa, Canada

G. R. Johnston, Agricultural Research Officer, and
N. M. Parks, Senior Horticulturist

In Canada table 1 the data on observation trials of 14 varieties grown on the Potato Testing Station at Hespeler, Ontario, are presented. The test was grown in a light, sandy loam of low water-holding capacity. Only 1.97 inches of rain fell from June to August 11, a period of nearly 9 weeks. This rainfall occurred as scattered light showers that barely moistened the surface of the soil. Also, during this period the temperature was higher than normal. This was the worst drought season experienced for this area in over 40 years. As a result, many potato varieties almost completely broke down as manifested by second-growth-sprout tubers, sprouts, knobs, and new plants emerging from current-season tubers in the ground. The percentages of total solids for many of the varieties was unusually low. Many fields of potatoes were completely unsuitable for table use.

However, a few varieties performed remarkably well under such adverse growing conditions. The standard varieties Katahdin and Irish Cobbler were almost a complete loss. Delus performed exceptionally well and did not break dormancy. It also was highest in percentage of total solids and excelled Katahdin in yield. Saco was high in yield but the worst one of all for second growth. Almost every tuber was affected and sent up new shoots which actually grew and produced small tubers. The table shows also data for several characters observed in this test other than yield and percentages of total solids.

Canada table 1. Data on observation trials of potato varieties grown at Hespeler, Ontario, 1955.

Variety	Maturity	Tuber appearance	Eye depth	Yield per acre	Marketable	Total solids	Scab	Boiled cooking quality			Remarks
								Flavor	Color	Texture	
				Bu.	%	%	% Type				
Katahdin	ML	F	S	327	36	15.1	4 D,S	G	G	P	Much second growth
I. Cobbler	E	F	D	221	37	16.5	5 D,S	E	VG	F	Much second growth & rough tubers
Osseo	VE	F	FD	239	55	14.9	2 S	G	G	P	Low solids & rough
Delus	M	G	M	K+	VH	20.2	1 S	G	E	E	No second growth; a little rough.
Teton	M	G	S	K+	H	16.0	3 S	E	E	F	Some second growth.
Saco	VL	P	S	K++	VL	16.7	2 D,S	G	FG	F	Most all tubers with second growth.
Merrimack	ML	F	M	K	L	18.4	1 S	G	FG	G	Much second growth & rough tubers.
Osage	L	P	S	188	40	15.3	1 S	E	FG	F	Rough, knobby tubers, many hollow heart.
LaSoda	L	F	M	K-	L	13.2	2 R,S	G	FG	P	Much second growth, little rough
Redburt	L	F	M	K-	L	14.7	2 R,S	G	E	P	do
Sheridan	L	G	M	K+	M	17.2	1 R,S	E	E	G	Some second growth, deep red skin.
Redkote	VL	FG	S	K+	FL	17.4	2 R,S	E	G	G	Much second growth, dark red skin.
Waseca	M	G	M	K	M	13.2	0	G	E	P	Some second growth, rough brown skin & shape.
Dazoc	ME	G	FD	231	57	14.9	1 D,S	E	E	P	Some second growth, deep red skin; many under-sized tubers.

1/ Symbols used:

D = Deep
E = Early or excellent
F = Fair or fairly
G = Good
H = High
K = Katahdin

L = Late or low.
M = Medium
P = Poor
R = Russet
S = Surface
V = Very

CONNECTICUT
Arthur Hawkins

Potato Variety Tests in Connecticut, 1955^{1/}

Two potato variety tests were conducted by the Storrs Agricultural Experiment Station, Storrs, Conn., on commercial potato farms in the Connecticut River Valley in Connecticut in 1955. Experimental procedures, observations on verticillium wilt, and shape of tubers are indicated in footnotes to the tables of yield and dry matter.

The Connecticut River Valley of Connecticut experienced one of the poorest growing seasons for potatoes on record. The mean temperature for July was the highest for any July or any month in 67 years, followed by high mean temperatures in August. During the dry July, potatoes at location 1 were not irrigated as frequently as desirable but were liberally irrigated weekly at location 2.

The hot conditions were followed by hurricane rainfalls of about 6 inches 8/11-13, and by another 6 or more inches 8/18-19, followed by additional rainfall resulting in excessive moisture most of the time until death of the plants. Such conditions resulted in the high incidence of jelly-end rot by some varieties, especially Russet Burbank at both locations. The temperature and moisture conditions plus early death of the vines at location 2 by verticillium wilt or early vine killing resulted in tubers of low dry-matter content.

Under the conditions that prevailed in Connecticut in 1955 Katahdin produced the highest volume of white-skinned tubers not seriously off-shape at both locations.

Conn. table 1. Yield and specific gravity of potato varieties and seedlings, East Windsor Hill, Conn., 1955. (Graded 2 days after harvest)

Variety or seedling ^{1/}	Total yield (Incl (Minus jelly jelly end) rot)		Yield ^{2/} per acre-over 1 7/8" ^{3/}				^{5/}	^{5/}
	Bu.	Pct.	Pct.	Bu.	Pct.	Bu.	Specific gravity	Dry matter
1. Delus	352	351	93.8	329	91.8	322	1.0635	16.2
2. Gr. Mountain	750	750	90.3	677	64.2	482	1.0731	18.2
3. Houma	786	776	87.3	677	74.6	579	1.0705	17.7
4. Katahdin	754	750	92.8	696	92.5	693	1.0601	
5. Kennebec	709	697	90.8	633	80.2	559	1.0556	
6. Merrimack	515	515	97.3	449	76.0	391	1.0627	16.0
7. Pontiac ^{1/}	808	782	91.0	711	83.3	655	1.0504	
8. Rus. Burbank	527	475	83.5	396	33.3	158	1.0704	17.6
9. Saco	928	889	88.7	788	60.9	541	1.0575	
10. Saranac ^{2/}	893	890	71.1	633	70.1	624	1.0514	
11. B 63-19	493	492	90.1	444	87.0	428	1.0694	
12. B 926-9	676	652	85.4	557	81.3	530	1.0497	

(continued)

^{1/} Seed supplied through cooperation of R. V. Akeley, U.S.D.A. Presque Isle, Maine.

- 1/ Spacing: 9 inches apart, except Houma, 15"; Rus. Bur. 18" in 36" rows.
Seed cut to $1\frac{1}{2}$ oz.
- Plots: 1 row 21 feet long. Replication: 4, in 4 randomized blocks (3 sections x 4 rows). No sprayer-wheel damage.
- Soil: Enfield fine sandy loam. Previous crop potatoes, rye cover, prior to that corn and tobacco. pH 5.8, medium in available P, K, and Mg.
- Fertilizer: 2,500 lbs. of 6-8-8 in row side-bands plus 40 lbs. N. plowed under.
- Season and Conditions: Planted 5/12/55. Very hot and dry early part of season, irrigated but not as frequently as desirable. About 6 inches rain Aug. 11-13, followed by another 6 inches or more Aug. 18-19. Ample to excess moisture until harvested. Delus about all dead latter part of Aug. Other, some green until early Oct.
- Verticillium wilt evident latter part of August from little in Saranac to 50% to 70% in susceptible Kennebec with other varieties having 10% to 30% incidence.
- 2/ Seed available for only 2 replicates of Saranac variety at this location.
- 3/ Percentage over 1 $7/8$, and free of off-shape on total yield minus jelly rot.
- 4/ Serious off-shape removed included knobby, dumbbell-shaped, very deep-eyed as in Saco, and other badly distorted tubers. See 6 below.
- 5/ Specific gravity by salt solution method. Average of 9 tubers (free of hollows) per sample x 4 replications. Dry matter calculated from specific gravity based on Maerker and Morgan 1879 and Foth 1907.
- 6/ Tuber Observations: Shape - 1. Delus, good shape tubers, good sized but few in number; 2. G.M. very poor shape, knobby; 3. Houma small, some knobby and jelly; 4. Kat. fairly good at west end, but drier east end some knobby; 5. Ken. some knobby; 6. Mer. many knobby; 7. Pont. few sl. knobby; 8. R.B. considerably jelly end, considerable knobby, many dumbbell-shaped; 9. Saco, small very knobby, deep eyed; 10. Sar. many very small, smooth-skinned, some growth cracks and chain growth; 11. fair shaped; 12. small knobby.
- Hollow Heart: 1. Del. one with hollow in 44; 2. G.M. 9 of 46; 3. Houma, 2/40; 4. Kat. 6/35; 5. Ken. 1/33; 6. Mer. 2/43; 7. Pont. 6/37; 8. R.B. 1/35; 9. Saco, none; 10. Sar. 1/18; 11. 8/44; 12. 2/40.
- Vascular Discoloration: Considerable in Delus, Merrimack, Kennebec, Saco; some tubers with slight in Kat. and Pont.
- Internal Drought Spot: Saco 1/40; Saranac 5/18 moderate; Kennebec 1/33 moderate.

Conn. table 2. Yield and specific gravity of potato varieties and seedlings Enfield, Conn. 1955*. (Graded about 4 weeks after harvested. Vines killed too early -7/15 for some varieties. Saranac 100% green; Katahdin 30-50%; Gr. Mountain 10-20%; B 63-19, 20%; Saco - few; others dead.)

Variety or seedling	Total yield (Incl (Minus jelly jelly ends) rot)		Yield per acre--over 1 7/8" 3/ Free of serious off shape				3/ Specific gravity	4/ Dry matter
	Bu.	Bu.	Pct.	Bu.	Pct.	Bu.		Pct.
1. Delus	299	299	93.3	279	93.3	279	1.0645	16.4
2. Gr. Mountain	698	665	90.3	600	72.4	481	1.0677	17.1
3. Houma	687	670	81.6	547	69.4	465	1.0649	16.5
4. Katahdin	674	658	94.8	623	94.8	623	1.0542	
5. Kennebec	626	602	88.7	533	88.7	534	1.0578	
6. Merrimack	390	386	85.7	331	78.9	305	1.0600	
7. Pontiac 1/	777	733	94.1	690	88.8	651	1.0457	
8. Rus. Burbank	419	266	78.5	209	40.4	107	1.0563	
9. Saco	793	751	86.6	651	52.4	394	1.0557	
10. Saranac	755	749	63.7	477	63.4	475	1.0528	
11. B 63-19	346	328	84.1	276	82.8	272	1.0611	
12. B 926-9	592	581	82.0	476	81.5	473	1.0497	

1/ Spacing: 9 inches apart except Houma, 15"; Rus. Bur. 18" in 35" rows. Seed cut to 1 1/2 oz.

Plots: 1 row 21 ft. long. Replication: 4, in four randomized blocks (3 sections x 4 rows). No sprayer-wheel damage.

Soil: Enfield fine sandy loam; 1954, tobacco plus rye cover; 1953-52 potatoes; pH 6.0; medium in Morgan available P, K, and Mg.

Fertilizer: 2100 lbs. of 8-10-10 in row side bands.

Season and Conditions: Planted 5/3/55. Very hot and dry season until early Aug. Irrigation used weekly and liberally followed by excessive rain, 6 inches 8/11-13, plus 6 or more inches 8/18-19. Ample to excessive moisture until dead or vine killed 9/14.

Verticillium wilt and Maturity: Russet Burbank badly infected by mid-Aug.

By the latter part of Aug. 80% to 90% of plants of all varieties infected with V.W. except Saranac which showed considerable resistance. Saranac nearly 100% green plants when vine killed by grower too early on 9/14; Kat. 30-50% green foliage; B 63-19, 20% green; Gr. Mt. 10-20%; Saco, few green; others

about all gone. 2/ Percentage over 1 7/8" and free off-shape on total yield minus jelly rot. 3/ Serious off-shape removed included knobby, dumbbell-shaped, very deeply eyed, as in Saco, and other badly distorted tubers. See 5 below.

4/ See rootnote 5 table 1.

5/ Tuber Observations: Shape: 1. Del. good shape, but "light set"; 2. Gr. Mt. some jelly, knobby, bottlenecks and generally poor shape; 3. Houma, small some dumbbell shaped; 4. Kat. Fairly good shaped; 5. Ken. fairly good shape; 6. Mer. poor shape, considerable knobs; 7. Pont. considerable jelly-end and knobby tubers; 8. R.B. very bad jelly-end, knobby; 9. Sac. few each jelly, knobby, dumbbell; 10. Sar. heavy set, small, killed too early; 11. B63-19 fair shape; 12. B 926-9 fair shape.

*Seed supplied through cooperation of R. V. Akeley, U.S.D.A., Presque Isle Maine.

Hollow Heart: Del. 3 in 40; Ken. 1/40; none in others.

Vascular Discoloration: 1. Del. 22 of 40 slight, 1 S.E.B. v. sl; 2. G.M. 10/40 v. slight, 1 severe; 3. Houma 6/47 v. sl; 4. Kat. 15/38 sl. 2 severe, 4 S.E.B. v. sl; 5. Ken. 23/49 v. sl., 3 moderate; 6. Mer. 12/48 v.sl. 7. Pont. 6/47 v.sl. 8. R.B. 18/46 V.sl; 9. Saco 25/51 v.sl. 1 mod, 1 sev. S.E.B.; 10. Sar. 13/44 v.sl. 4 mod; 11. B63-19 8/45 v.sl. 1 mod; 12. B926-9, 13/55, 1 sev. plus 1 v.sl. E.E.B.

FLORIDA (Hastings)
A. H. Eddins

Corky Ringspot

Corky ringspot was very mild in infested potato fields in the Hastings area in 1955. Growers who had complained about excessive losses from the disease in previous seasons reported no damage this year.

Plymouth, Merrimack and USDA selections B 294-65, B 313-21, B 381-2, B 595-76, B 606-3, B 721-1, B 926-9, and B 3010-4 which had shown no symptoms of corky ringspot in previous seasons were planted in 3 locations in corky ringspot infested soil in alternate or adjacent hills with the susceptible variety Russet Sebago. Red Warba, Red Pontiac, Sebago and Saco also were included in the tests. More extensive plantings of Sebago, Plymouth, Saco and Merrimack were made in another infested area. No symptoms of corky ringspot were found in tubers of the different varieties grown in the 4 locations. This was surprising, as tuber infection in susceptible Sebago grown in the same locations last year varied from 12 to 50%, and in 1953 infection in Sebago ranged from 21 to 93 percent in one of the locations. Reasons for nonoccurrence of the disease in infested soil in 1955 are unknown.

Potato Variety Tests in 1955
A. H. Eddins and E. N. McGubbin

Comparisons were made of yields and other characteristics of 21 USDA potato seedling selections and 7 varieties grown at the Potato Investigations Laboratory in 1955. Above ground parts of the plants were killed by freezes on February 12 and 13 when 3 to 4 inches tall. Most plants recovered but their growth was retarded and their yields were reduced to about two-thirds of normal.

None of the varieties or selections significantly excelled Sebago, the standard variety, in yield as is shown in Florida table 1. Red Warba, Russet Sebago and 11 seedling selections produced significantly lower yields than Sebago.

Plymouth, B 926-9, 3865, Merrimack and Saco produced rougher tubers than Sebago. This roughness was caused by enlarged eyes or eyebrows, knobs or indentations near the eyes or at the bud end.

Some varieties and selections were more prone to mechanical injury than others. Those showing most injuries were Merrimack, 4429, 3954 and 3962.

Selection 4112 produced very large, thick, white tubers which were a little rough and 1.7 percent bore scab lesions.

Selection 3769 produced the most immature tubers which skinned badly and developed browning in the skinned areas.

Scabby tubers totaling 0.3 to 6.9 % were found in Red Warba, Russet Sebago and 7 selections. The worst affected selections were 3953 and 3633.

Skin of tubers of 1859 and 4753 was a pale pink. These selections are undesirable unless the tubers are waxed and dyed red before shipment. Tubers of 3954 have a yellow flesh and also are undesirable.

Fla. table 1. Results of potato variety tests at Hastings, Florida, in 1955.

Variety or selection ^{1/}	Bushels per acre		Dry matter Pct.
	U.S. 1A	U.S. 1A + 1B	
Red Pontiac	297	326	16.7
4112	295	319	17.7
Plymouth	286	317	17.8
B 926-9	278	307	18.3
3865	276	305	19.9
3674	253	308	16.7
Merrimack	253	288	19.9
Sebago	252	292	17.7
2988	244	285	19.9
1859	243	291	18.8
Saco	233	263	19.9
4429	227	281	17.8
B 69-16	224	260	17.8
3769	210	236	15.5
Red Warba	193	219	19.9
Russet Sebago	178	212	17.7
4750	177	205	17.7
B 595-76	152	207	19.9
4409	151	191	16.6
4769	141	166	17.5
3953	134	152	17.8
4420	127	173	--
4454	127	159	17.8
4735	119	167	--
3633	91	113	18.8
3954	80	127	--
3962	58	78	--
4735	56	137	--
L.S.D. 5%	58.3	61.0	
1%	77.2	80.0	

^{1/} Each replicated 6 times in 11-hill plots; planted January 5 and dug May 10, 1955.

IDAHO (Lewiston)
Darrell R. Bienz

The Lewiston potato variety trials were conducted under irrigation at the Lewiston Field Station at an elevation of about 850 feet. The soil at the station is a silt loam, and the frost-free period is usually about May 1 to October 20. In 1954 the potatoes were planted on April 21 and in 1955 on May 2 and were harvested on September 7 and 16, respectively. Stands of almost 100% were obtained both years. The 1954 crop showed some disease. However, in 1955 there was little disease and the experiment looked good throughout the season. Both seasons were comparatively cool which may have affected the relative performance of the different varieties.

The yields and specific gravity are shown in Bienz tables 1 and 2.

Bienz table 1. Yield and specific gravity of potatoes grown at Lewiston in 1954.

Variety	Total sacks per acre	U.S. No. 1 sacks per acre	Specific gravity	Total solids
Bliss Triumph	343	326	1.085	20.8
Early Gem	277	224	1.083	20.4
Russet Burbank	322	232	1.094	22.7
Kennebec	368	340	1.083	20.4
Chippewa	331	301	1.076	18.8

Bienz table 2. Yield and specific gravity of potatoes grown at Lewiston, Idaho, in 1955.

Variety	Total sacks per acre	U.S. No. 1 sacks per acre	Specific gravity	Total solids
				Pct.
Early Gem	240	203	1.077	19.1
White Rose	399	308	1.091	22.1
Bliss Triumph	317	282	1.085	20.8
Red Baker (B2368-4)	483	438	1.092	22.2
Russet Burbank	285	221	1.096	23.2
Pontiac	526	482	1.090	21.9
L.S.D. 5%	14	17	.004	21.9
" 1%	18	23	.006	

Under conditions existing at Lewiston in 1954 and 1955 both Early Gem and Russet Burbank tended to yield somewhat less than did the other varieties. This confirms the 1953 results for these two varieties. In 1955 White Rose produced quite a few rough tubers and tended to be somewhat later than the other "early" varieties, i.e. "Red Baker" (B 2368-4), Triumph, Pontiac and Early Gem. Both Pontiac and "Red Baker" were outstanding in appearance, earliness, quality and yield at Lewiston in 1955.

IDAHO (Parma)
Roger F. Sandsted

Temperatures in April and May were much below normal at the Parma Branch Station, although there was no frost damage to the potato crop. June was cool at both the beginning and latter part of the month, but averaged 2.1° F. above normal. July was 3.7° F. below average normal temperature, while August was about normal. Rainfall was 0.94 inches above normal in April but otherwise near normal for the entire season.

Early Gem Fertilizer Trials

Growth cracks in the Early Gem variety have been a serious defect of the tubers at Parma. An irrigated trial of 7 different fertility treatments was conducted to study the effect of fertility level on the amount of growth cracking.

Although total yields (Sandsted table 1) tended to be higher at the/fertil-
ity levels than from the check there was very little difference in yields of U.S. No. 1 tubers from the various treatments. The percentages of growth-cracked tubers from the various treatments were inconsistent. The avail-

able nitrogen in the soil was probably high before any fertilizers were applied due to summer fallowing in 1954. Results from a trial in 1954 indicated somewhat more definitely that higher rates of nitrogen may cause more growth-cracked tubers in Early Gem (Sandsted table 2).

Early Gem Plant Spacing Trials

A trial was conducted in 1955 to study the effect of plant spacing on growth cracking in Early Gem (Sandsted table 3). Although higher total yields and yields of U.S. No. 1 tubers were obtained from 8.2-inch and 10.7-inch spacings than from the 13-inch spacing, the differences were not statistically significant. There was no marked difference in the percentage of U.S. No. 1 tubers or in the percentage of growth-cracked tubers from the different plant spacing. Results from a trial in 1954 indicated somewhat more definitely that closer plant spacing may reduce the percentage of growth-cracked tubers in Early Gem (Sandsted table 4).

Sandsted table 1. Early Gem fertilizer trial ^{1/} Parma Branch Station, 1955.

Fertilizer treatment	2/ Total	Yield per acre				Specific gravity	Total solids
		U.S. No. 1		Growth			
		over 2"		cracked			
	Bu.	Bu.	Pct.	Bu.	Pct.		Pct.
160-80-40	590	312	53	174	29	1.0718	17.9
160-80-0	586	304	52	181	31	1.0722	17.9
160-0-0	518	304	59	128	25	1.0720	17.9
80-80-0	549	310	56	161	29	1.0750	18.6
80-0-0	523	317	60	123	24	1.0768	18.9
0-80-0	471	290	62	114	24	1.0772	19.1
0-0-0	486	302	62	134	27	1.0772	19.1
L.S.D. 5%	56	N.S.		36		0.0044	
" 1%	76			50		N.S.	

^{1/} Soil: Greenleaf silt loam, irrigated
 Previous crop: Summer fallow
 Planting date: April 12, sidedressed April 28
 Experimental design: Randomized block, 4 replications, 2-row plots
 138' long; plant spacing, 1 x 3 feet.
 Harvest dates: July 2 and 3.

^{2/} Pounds N, P₂O₅, and K₂O, respectively. Mixture of ammonium sulfate, single superphosphate, and muriate of potash.

Sandsted table 2. Early Gem fertilizer trial ^{1/} Parma Branch Station, 1954.

Fertilizer treatment <u>2/</u>	Total	Yield per acre				Specific gravity	Total solids
		U.S. No. 1		Growth			
		over 2"		cracks			
	Bu.	Bu.	Pct.	Bu.	Pct.		Pct.
120-80-40	470	336	71	87	18.5	1.074	18.4
120-80-0	441	304	69	88	20.0	1.074	18.4
40-80-0	422	300	71	81	19.2	1.077	19.1
0-80-0	354	272	77	44	12.4	1.078	19.4
0-0-0	359	267	74	52	14.5	1.079	19.6
L.S.D. 5%	33	33		10		0.001	
" 1%	45	45		14		0.001	

^{1/} Soil: Greenleaf silt loam, irrigated. Previous crop: Several vegetable row crops. Plant dates: April 8 and 9, sidedressed April 15, and 16. Experimental design: Split plot, 4 replications, single-row plots 30' long. 3 plant spacing, 2 irrigation levels. Harvest dates: July 29 and 30.

^{2/} Pounds, N, P₂O₅ and K₂O, respectively. Mixture of ammonium sulfate, single superphosphate, and muriate of potash.

Sandsted table 3. Early Gem plant spacing trial ^{1/} Parma Branch Station 1955.

Plant spacing ^{2/}	Total	Yield per acre				Specific gravity	Total solids
		U.S. No. 1 over 2"		Growth cracked			
Inches	Bu.	Bu.	Pct.	Bu.	Pct.	.	Pct.
8.2	546	356	65	108	20	1.0740	18.4
10.7	513	320	62	111	22	1.0735	18.2
13.0	470	301	64	98	21	1.0750	18.6
L.S.D. 5%	N.S.	N.S.		N.S.		N.S.	

^{1/} Soil: Greenleaf silt loam, irrigated. Previous crop: Summer fallow. Fertilizers: 160-80-0 pounds of N, and P₂O₅, respectively, broadcast in the form of ammonium sulfate and single superphosphate. Plot design: Randomized block, 4 replications, 2-row plots, 138' long. Planting date: April 13 and 14. Harvest date: July 2.

^{2/} Although 6-, 9-, and 12-inch spacing sprockets were used on the planter, these were the actual average plant spacings.

Sandsted table 4. Early Gem plant spacing trial ^{1/}, Parma Branch Station, 1954.

Plant spacing	Total	Yield per acre				Specific gravity	Total solids
		U.S. No. 1 over 2"		Growth cracked			
Inches	Bu.	Bu.	Pct.	Bu.	Pct.		
6	460	340	74	68	14.8	1.076	18.9
9	404	292	72	69	17.1	1.077	19.1
12	364	255	70	75	20.3	1.076	18.9
L.S.D. 5%	NS	35		N.S.		N.S.	
" 1%		46					

^{1/} Soil: Greenleaf silt loam, irrigated. Previous crops: Several vegetable row crops. Planting dates: April 8 and 9, sidedressed April 15 and 16. Experimental design: Split plot, 4 replications, single-row plots 30' long. 5 fertilizer treatments, 2 irrigation levels. Harvest dates: July 29 and 30.

Variety Trials

Two variety trials were conducted at the Parma Branch Station in 1955 with 7 varieties. Both trials were planted April 13. One trial (Sandsted table 5) was dug August 3, and the other (Sandsted table 6) October 18. All vines in the late-harvest trial were dead by September 1 or shortly thereafter from late blight. The tubers did not rot from the blight probably because of the dry condition of the soil.

"Maine Red" (B 2368-4) and Early Gem were both subject to heavy growth cracking. White Rose was very immature at the first harvest, and had a large percentage of tubers with undeveloped ends. "Maine Red" tubers were more blocky in conformation than Pontiac and showed a tendency for very deep eyes on the apical end. Dazoc tubers were smaller and somewhat deeper-eyed than Pontiac or Triumph tubers.

Sandsted table 5. Potato variety trial ^{1/} Parma Branch Station, 1955.

Variety	Total	Yield per acre				Specific gravity	Total solids
		U.S. No. 1 over 2"		Growth cracked			
	Bu.	Bu.	Pct.	Bu.	Pct.		Pct.
Pontiac	551	445	80	6	1	1.0686	17.2
Dazoc	478	395	83	0	trace	1.0752	18.6
Triumph	479	358	75	39	8	1.0746	18.4
Maine Red (B 2368-4)	500	336	67	106	21	1.0722	18.0
White Rose	485	334	69	2	trace	1.0692	17.4
Early Gem	434	219	50	145	33	1.0744	18.4
L.S.D. 5%	62	69		36		0.0039	
" 1%	N.S.	93		49		0.0053	

^{1/} Soil: Greenleaf silt loam, irrigated. Plot design: Randomized block, 5 replications, 1-row plots, 54 feet long. Plant spacing 1x3 feet.

Sandsted table 6. Potato variety trial ^{1/}, Parma Branch Station, 1955.

Variety	Total	Yield per acre				Specific gravity	Total solids
		U.S. No. 1 over 2"		Growth cracked			
	Bu.	Bu.	Pct.	Bu.	Pct.		Pct.
Pontiac	895	766	86	11	1	1.0770	19.1
Maine Red (B 2368-4)	811	648	80	126	16	1.0864	21.0
White Rose	672	494	74	5	1	1.0876	21.2
Russet Burbank	591	383	65	23	4	1.0876	21.2
L.S.D. 5%	93	105		29		0.0035	
L.S.D. 1%	131	148		41		0.0050	

^{1/} Soil: Greenleaf silt loam, irrigated. Plot design: Randomized block 5 replications, 1-row plots, 54 feet long. Plant spacing 1 x 3 feet.

IDAHO (Aberdeen)
W. C. Sparks

Comparison of 7 Varieties of Potato for Yield, Grade, and Quality, 1955.

Red Pontiac, Bliss Triumph, White Rose, Early Gem, Russet Burbank, Maine Red

(B 2368-4), and Menominee were included in the variety trial at Aberdeen. Each plot was 1 row wide, 50 feet long, and contained 50 seedpieces. Seven replications of each treatment were arranged in a 7 x 7 Latin square.

The potatoes were planted May 6 and the first emergence was noted June 8. Not enough plants were through the ground to take stand counts, and the Early Gem did not seem to be coming up as rapidly as the Russet Burbank and other varieties. On July 6 the first blossoms appeared on Menominee, which was surprising, as Menominee was probably the latest maturing of all the varieties planted in this trial.

The production index and percentage U.S. No. 1 over 10 ounces and the specific gravity are given in Sparks table 1. The production index refers to an index computed by multiplying the yield of U.S. No. 1 by a factor of 200, the No. 2 by 50, and the culls by 25. These factors are in approximation of the monetary value of Russet Burbank during the season and gives an estimate of the amount of money per acre that can be realized from the various varieties provided they can be sold at the same price that would be received for Russet Burbank. This assumption is not valid, because most varieties bring a much lower price than Russet Burbank. The two highest production index varieties are red varieties. Red Pontiac and Maine Red both produce a high yield of marketable size potatoes. This assumption is not valid because we know that in the western part of the State this year while red varieties were bringing the farmer 40 to 50 cents per cwt., Early Gem and Russet Burbank were bringing \$1.25 per cwt. For this reason, I do not believe that this assumption is valid.

These data show, as in previous years, that the Russet Burbank produced lowest in U.S. No. 1, or production index. This shows that if the average price of U. S. No. 1 was \$2, U.S. 2, 50 cents, and culls 25 cents, the average income per acre of Russet Burbank would be \$221.60 compared with other varieties that would go up as high as to \$602, but since Red Pontiac would sell for, maybe, 75 cents while Russet was selling for \$2, this figure is only indicative. In the future when almost all the varieties being compared will be Russets and will receive Russet prices, this index should prove of great value. At present, the production index may be erroneous because of the inability of other varieties to sell for the same high market price that is obtained by the Russet Burbank.

Early Gem had the lowest percentage of tubers over 10 ounces and Maine Red the highest. Russet had a very excellent percentage of large tubers, as 33% of the tubers were 10 ounces or larger. This size tubers bring a premium on the market, especially from people making french fries. The specific gravity of the varieties shows that the Menominee produced the highest. This has been the case for several years. Maine Red ranked second, followed closely by Russet. Menominee was significantly higher in specific gravity than any other variety tested. There was no significant difference between Russet Burbank and Maine Red, but each of these was

Sparks table 1. Comparison of seven varieties of potatoes at Aberdeen, 1955.

Variety	Production index	Yield U.S. #1	10 oz. and over	Specific gravity	Total solids
		Sx/A	Pct.		Pct.
Red Pontiac	602	293	29.7	1.0754	18.7
Bliss Triumph	402	216	25.8	1.0716	17.9
White Rose	309	121	42.3	1.0720	18.0
Early Gem	307	124	18.5	1.0636	16.2
Russet Burbank	222	79	33.4	1.0803	19.7
Maine Red					
(B 2368-4)	544	265	49.9	1.0817	20.0
Menominee	445	216	36.9	1.0873	21.2
L.S.D. 5%	75	82	9.2	.0036	
" 1%	101	111	12.3	.0043	

significantly higher than the other varieties tested. Early Gem was significantly lower in specific gravity than any of the other varieties, but because of the shape of Early Gem and russet appearance, to quote an August market report: "Red varieties were bringing 40 to 50 cents to the grower; Early Gem was bringing \$1.25 to the grower." This difference is substantial enough to offset many other drawbacks that this variety might have.

IOWA
August E. Kehr, Allen E. Schark, and Frank Manzer^{1/}

The potato-breeding program in Iowa is a cooperative project between the Departments of Horticulture and Plant Pathology of Iowa State College and the U.S. Department of Agriculture, and is about equally supported by funds from the sources named. The breeding and disease testing work is all done at Ames, and the early generation testing is done on a plot of peat soil rented from Sam Kennedy at Clear Lake, Iowa.

Environmental Conditions. The peat land plots at Clear Lake were subjected to quite a variety of unfavorable climatic conditions. A period of drying winds, particularly severe followed the planting on May 2. No rain fell from May 20 to July 4, at which time the ground was completely saturated by a severe storm, and the plots were also severely damaged by hail. The potatoes suffered from this uneven rainfall distribution and particularly from the hot weather that followed. Almost no rain fell after early July.

Seed and Seedling Production. Crosses made in the greenhouse at Ames during the winter of 1955 were aimed at resistance to scab, late blight, virus X, and leaf roll, as well as high yields and high quality. In addition, a few crosses involved resistance to ring rot, virus Y, and verticillium wilt. Seed production was excellent and a total of 331 crosses were made with seed counts amounting to as high as 17,000 per cross, or an estimated total of nearly 493,000 seeds. Wherever possible crosses were made to pyramid disease resistance, quality, and yields into a single line. This seed will be aged before planting in order to obtain better germination. Thus seed produced in the spring of 1955 will not be planted until 1956.

Seed from 1953 crosses was planted in August of 1954, and about 16,000 seedlings were grown, most of which had survived screening tests for late blight and virus X. From these seedlings almost 13,000 were distributed to 10 experiment stations throughout the country, as follows:

<u>State</u>	<u>Cooperator</u>	<u>Progenies</u>	<u>Total distributed</u>
		No.	No.
Michigan	N. R. Thompson	10	852
"	W. J. Hooker	1	752
Ohio	J. P. Slesman	61	2,701
Wisconsin	G. H. Rieman	12	925
Minnesota	F. A. Krantz	4	221
North Carolina	F. L. Haynes	7	346
North Dakota	W. G. Hoyman	12	1,260
Louisiana	T. P. Dykstra	10	1,445
Nebraska	H. O. Werner	12	1,442
West Virginia	K. C. Westover	19	1,025
Indiana	N. K. Ellis	27	1,701
		Total	12,650

^{1/} Dr. W. J. Hooker was co-leader in this project untid December 1954, and Mr. Albert P. Benson until September 1955, both are now at Mich. State Univ.

Interspecific Hybridization. Many of the uncultivated *Solanum* species are claimed to contain disease and insect resistance. It is felt that the Ames program should include as much work in interspecific hybridization as time will permit. Consequently, in addition to the above-intervarietal crosses 89 interspecific hybrid combinations were successful. Some of these include F_1 hybrids, but many were first and second backcrosses to *Solanum tuberosum*. A total of 57,000 seeds were obtained. Most of these carried resistance to late blight, leaf roll, virus X, scab, and virus Y. Much of the parental material for this work came from R. W. Hougas at Sturgeon Bay, Wis. Clonal lines of *Solanum* species and derivatives were distributed as follows:

<u>Station</u>	<u>Cooperator</u>	<u>No. lines</u>
Ohio	J. P. Slesman	17
Wisconsin	R. H. Larson	20

Field Plots. At Clear Lake 710 observation plots were grown on the peat land farm. Most of these were advanced selections. Selections saved have been subjected to further tests including chipping quality, specific gravity, and observation for external and internal quality.

In addition, 408 plots were grown under disease-free conditions at Northwood, N. Dak., in cooperation with Dr. W. G. Hoyman. This cooperation is a most valuable part of the breeding program since it is through this means that advance selections that may ultimately be released as new varieties may be kept free from diseases. All material which is planted at Northwood has been tuber indexed in the greenhouse at Ames in cooperation with the Plant Pathology Department. At Northwood from the 408 plots 81 selections were saved.

Distribution of clonal lines of Iowa selections were made as follows:

<u>Station</u>	<u>Cooperator</u>	<u>No. lines</u>
Michigan	W. J. Hooker	271
Alaska	C. H. Dearborn	10
Quebec	J. O. Vandal	1
Minnesota	C. O. Turnquist	2

Leaf Roll. Resistance to leaf roll in the seedling stage is being determined by a method perfected by Dr. W. J. Hooker. Potted seedlings were planted in 12' x 24' x 6' cages covered with 32 x 32 mesh lumite. After completely eradicating any insects within the cage viruliferous aphids were released to inoculate the seedlings. For this work 3 additional cages were constructed, so that for 1955 there were 5 cages holding nearly 8,000 seedlings. The healthy seedlings will be grown in an isolated area and selections made for other characteristics. In October 1955 4,846 seedling tubers from 5 progenies were harvested from these cages.

Single-Hill Plantings. Approximately 22,000 single-hill plots were planted on the peat soils at Clear Lake. This unusually large number was brought about as a result of an attempt to grow out progenies from the Ames greenhouse crop of 1953 lost in the 1954 flood. Three single-hill plots were

received from the following sources:

Station	Cooperator	Source	No. Progenies	Total No.
Ames	-----	Ames Greenhouse Crop	1954 97	15,186
Ohio	J. P. Slesman	" "	1953 26	385
West Va.	K. C. Westover	" "	1953 10	77
N. Carolina	F. L. Haynes	" "	1953 21	167
Wisconsin	G. H. Rieman	" "	1953 39	1,983
N. Dakota	W. G. Hoyman	" "	1953 13	816
Beltsville	F. J. Stevenson	Beltsville "	1954 25	2,889
Louisiana	J. C. Miller	Baton Rouge "	1954 7	240
"	T. P. Dykstra	Ames Greenhouse Crop	1953 6	93

21,836

Selections from the single-hill plots were few, largely because of the unfavorable growing conditions, along with a high incidence of scab. Only 78 selections were saved, representing about 0.28% saved from the total of 21,836 single-hill plots. It is felt that the selection pressure brought about this season eliminated many "fringe" selections which ordinarily would be saved in a normal season, and that those saved should therefore be unusually superior.

Iowa Yield Trial. The Iowa yield trial included 35 entries of advanced seedlings, and named varieties were checks. It has already been indicated that the environmental conditions at Clear Lake were not normal, and the yields were lower than usual. Scab infection was unusually heavy and only the most resistant lines such as Cherokee, Osage, I 801-10, I 8140-1, I 912-6, and B 3131-8 were relatively free of severe scab (Iowa table 1).

Iowa table 1. Yields of potato varieties and seedlings, Clear Lake, 1955.
4 Replications

Variety	Color	Matur- ity	Yield US#1 over 1 7/8" per A	Rank	1/ Total solids	Scab Ar Ty	2/ Scab	2/ Growth cracks
			Bu.		Pct.		Pct.	Pct.
Cobbler	W	E	287.8	1	18.0	2 4	98	1
La 1354	R	M	279.8	2	17.3	3 3	92	7
I 1092-2	W	L	267.0	3	17.5	2 2	85	0
R. Pontiac	R	L	240.0	4	13.9	2 4	98	24
I 1073-1	W	ME	223.1	5	15.0	1 1	60	1
I 961-1	W	E	178.6	6	16.0	1 4	89	0
Cherokee	W	ME	167.8	7	16.0	1 1	72	9
I 801.10	W	ME	166.5	8	16.7	1 1	53	3
I 8168-1	W	ME	159.6	9	14.1	2 3	72	4
R LaSoda(Stark)	R	L	148.9	10	16.2	1 3	100	11
I 911-7	W	L	146.7	11	18.4	1 3	64	8
I 8140-1	R	L	143.7	12	17.3	T 1	26	5
I 915-4	W	ME	143.1	13	15.4	1 2	100	4
Kennebec	W	ME	140.8	14	15.6	2 3	67	0

Iowa table 1 continued

Variety	Color	Matur- ity	Yield US [#] 1 over 1 7/8" per acre	Rank	Total ^{1/} solids	Scab Ar Ty	2/ Scab	Growth ^{2/} cracks
			Bu.		Pct.		Pct.	Pct.
B 3106-Ia.4	W	ME	138.9	15	16.2	2 3	55	4
Osage	W	ME	128.7	16	17.1	T 1	47	2
I 1129-5	W	ML	125.2	17	15.6	1 2	88	0
W 137-5	W	L	124.9	18	15.2	2 3	96	32
Sebago	W	M	121.8	19	13.7	3 1	96	0
I 912-6	W	ME	121.5	20	15.2	1 1	56	0
Rushmore	W	ML	117.4	21	15.6	1 4	98	3
B 2847-Ia.5	W	E	116.9	22	13.3	3 3	96	4
I 1107-3	W	M	111.3	23	15.2	1 3	64	8
B 3124-Ia.3	W	ME	104.1	24	14.5	1 3	56	8
R LaSoda(S.D.)	R	M	92.7	25	14.1	1 3	21	6
Ontario	W	L	91.3	26	15.0	2 2	24	0
B 3131-8	R	ME	90.3	27	16.2	T 1	20	4
B 3194-Ia.1	W	E	73.9	28	--	- -	--	-
B 3131-Ia.12	R	M	50.1	29	--	2 3	94	2
B 2924-2	W	M	45.5	30	12.0	2 3	56	4
B 2068-23	W	M	44.8	31	14.8	3 3	76	12
I 1037-1	W	ME	41.1	32	14.3	1 2	100	1
B 3131-Ia.18	R	ME	40.7	33	12.9	3 3	60	4
I 1107-1	W	ME	31.8	34	14.3	1 4	--	0
B 3148-Ia.4	R	L	20.3	35	--	- -	--	-
L.S.D. .05			44.9					
" .01			64.3					

Date of planting: May 2, 1955. Date of Harvest: September 19, 1955.
 Fertilizer: 900# 0-9-27. Spacing: 12" in row, 36" between rows.
 Sprays: Bordeaux and DDT at 7-10 day intervals June 8 - August 1.

^{1/} Based on an average of 4 replications using 25 tubers in each replication.
^{2/} Number in 4 replications of 25 tubers each.

Cobbler and Red Pontiac had high yields of U.S. #1 potatoes but also had a high incidence of scab. This is true also of La. 1354. Most promising was I 1092-2 which not only yielded as much as Red Pontiac, but had a high degree of scab resistance. Other somewhat less promising scab-resistant selections were I 801-10 and I 8140-1. These selections are being used as parents in the breeding program because of their high degree of scab resistance. The relatively high yielding, scab-resistant seedling, I 1073-1 has been discarded because it had yellow flesh.

North Central Regional Trial. At Clear Lake 9 entries and 3 check varieties were tested in the North Central Regional Trials. The Iowa entry for 1955 was I 803-3 which has been a promising selection, although it did not perform well in 1955 under Iowa conditions.

Ranked in order of over-all performance were N.D. 457-1-16, Mich. 1363, Wis. O-103.51, N.D. 2910-1R, and Wis. D 27.50. The last selection was by far the most scab resistant (Iowa table 2.)

Iowa table 2. Yield of potato varieties and seedlings North Central Region trials, Clear Lake, 1955.

Variety	Color	Matur- ity	Yield	Rank	Total solids	Scab		Growth cracks	Overall evaluation rank
			U.S. #1 per acre			Ar. Ty	Pct.		
			Bu.		Pct.		Pct.	Pct.	
Cobbler	W	ME	377.6	1	17.5	1	4	98	0
ND 457-1-16	W	ME	295.1	2	15.8	1	4	86	8
Red Pontiac	R	M	262.6	3	14.3	1	3	88	7
Mich. 1363	W	ME	253.3	4	16.5	2	4	97	2
ND 2910-1R	R	L	231.2	5	16.9	3	3	87	13
Wis. O 103.51	W	M	185.9	6	16.7	3	3	89	1
Minn. 12	W	E	176.6	7	15.6	T	3	76	1
Wis. D 27.50	W	ME	160.3	8	14.1	2	1	57	2
Triumph	R	E	148.7	9	14.8	1	3	67	18
I 803-5	W	E	137.1	10	15.4	2	3	77	32
Minn. 119	W	L	120.8	11	15.4	3	3	82	0
Wis. Sl.55	W	L	97.6	12	15.4	2	2	32	7
L.S.D. .05			83.0						
" .01			112.0						
Coeff. of variability			34.0%						

Date of planting: May 2, 1955. Date of harvest: September 19, 1955.
Fertilizer: 900# O-9-27. Spacing: 12" in row, 36" between rows.
Sprays: Bordeaux and DDT at 7-10 days intervals June 8 - Aug. 1.

Calcium Hydroxide Tests to Control Scab. At the suggestion of Dr. T. P. Dykstra of the Southern Project, at Baton Rouge, and with the cooperation of the Plant Pathology Department a randomized trial with 4 replications was planted on the peat soils at Clear Lake. Each plot consisted of 4 rows, of which only the 2 center rows were harvested. There were no significant difference in scab incidence between the check treatment and 50,100, and 200 pounds of calcium hydroxide per acre supplied broadcast. (Iowa table 3).

Iowa table 3. Scab readings on random samples of 100 tubers of Irish Cobbler variety treated with calcium hydroxide, Clear Lake, 1955.

Treatment	No. tubers showing scab type						Scab index
	0	T	1	2	3	4	
No treatment	34	35	13	11	6	1	37.3
50# Ca(OH) 2 1A	5	27	25	29	12	2	53.7
100#	8	48	10	16	14	3	48.1
200#	13	48	14	10	12	3	42.2

No significant difference

Irish Cobbler yielded significantly higher on the plots treated with calcium hydroxide. No explanation is offered for this yield increase (Iowa table 4). The acid reaction of the peat at Clear Lake is approximately pH 6.8, and the addition of calcium hydroxide would therefore not ordinarily be expected to improve yields because of an unfavorable acid content of the peat.

Iowa table 4. Yields of Irish Cobbler as affected by calcium hydroxide treatments, Clear Lake, 1955.

Treatment	Total yield per acre	US#1 per acre
	Bu.	Bu.
No treatment	180.7	148.1
50# Ca (OH)2 per acre	216.0	181.4
100# "	204.7	173.1
200# "	273.7	235.2
L.S.D. 1%	38.5	35.9
" 5%	55.4	51.7

Release of I 803-3 as a Named Variety: One of the promising seedlings in this program is I 803-3. This selection was bred and selected by Dr. C. E. Peterson and Dr. W. J. Hooker, formerly of this project, who wish to release this variety in the near future. This selection has the following desirable characteristics:

- (1) Immunity to latent mosaic (virus X)
- (2) Resistance to the common race and one specialized race of late blight.
- (3) Resistance to scab.
- (4) Matures ahead of Irish Cobbler.
- (5) Cooking quality equal to Irish Cobbler.

This selection was entered in the 1955 North Central Regional Trials and in the National Scab Trials.

KENTUCKY
Clyde Singletary

This was an excellent year for potatoes in Kentucky and a good year for variety testing. The 2 varieties that looked exceptionally good were Saco, a white variety, and Red Pontiac, a red variety. Red Pontiac is about the nicest red variety that I have ever seen.

I have starred 5 varieties that we are particularly interested in testing again.

Kentucky table 1. Potato variety test at the Kentucky experiment station, Lexington, Ky., 1955.

Variety	Spring		Fall	
	<u>Yield per acre</u>		<u>Yield per acre</u>	
	<u>No. 1</u>	<u>Total</u>	<u>No. 1</u>	<u>Total</u>
	Bu.	Bu.	Bu.	Bu.
X1276-185	615	734		
Kennebec*	643	751	500	628
Cherokee	543	661	131	216
Saco*	753	944	375	533
Merrimack	502	564	374	448
Sebago	520	612		
Katahdin	542	626	388	447
Teton	663	733	377	492
Plymouth	586	684	271	305
Delus	338	392	407	459
Red Pontiac*	721	832		
B 2368-11*	630	812		
B 73-3	462	550		
Marygold	483	618		
B 2368-4*	651	796		
Irish Cobbler	501	604	309	355

Four replications, 25 feet per replicate.

LOUISIANA ^{1/}
John R. King and Julian C. Miller

Late spring frosts in Louisiana in 1955 severely cut back the potato plantings at Baton Rouge. However, the breeding material finally began flowering late in April --nearly a month late. The average maximum day temperature during the extent of the pollinations was 87.2°F., with a minimum of 60°F. and above for one-half of the nights. Pollen production and the viability of fresh pollens were below those in 1954, when the breeding season extended from late March through April, and in cooler weather.

Crossing, therefore, was limited by the small amount of flowering. Fifty-five parental combinations were made among the 60-odd varieties and selections in the breeding plot. Only nine of these produced pollen strong enough, and in sufficient quantity, for pollinations. Two of these produced no seed balls in crosses.

A limited amount of stored pollen was used in the crosses this year - (on an experimental basis) with very encouraging results. The set of seed balls from all pollinations made with 1955 pollens was 5% while the set from those made with stored (1954) pollens was 22.7%. The average set of seed balls from successful pollinations with 1955 pollen was 29.8% and the average set with stored (1954) pollens was 34.4%.

Around 5,000 seedlings from 11 parental combinations and 16 selfs were grown in the greenhouse, together with a similar number of seedlings grown in relation to disease resistance potentialities, late in 1954. From these seedlings, 400 individual tubers were selected for planting in South Dakota in May of this year.

The two late frosts (about two weeks apart) damaged our test plots seriously. Many of the potatoes were so badly hit as to not recover. It was interesting to note, however, that the LaSoda variety made a faster and more complete recovery than did most of the other varieties and seedlings in the trials. Of the 7 plantings in Louisiana, only one approached normal. That was at the Plaquemines Parish Experiment Station, where the frost damage was least. This fact should be kept in mind by anyone observing the yields in Louisiana during the past seasons. In the LaSoda spacing test there was not only less frost damage this year where the potatoes were planted closer together, but also higher yields (table 1) than where they were planted farther apart.

^{1/} In cooperation with T. P. Dykstra of the U.S. Department of Agriculture and the National Potato-Breeding Program.

Table 1. Seed spacing tests covering 2 years on LaSoda variety (each yield figure represents average of 1954 and 1955).

Spacing between seed pieces*	Location				
	Baton Rouge	New Roads	Donaldsonville	Diamond	Average
6 inches	188	321	191	215	229
8 inches	187	334	197	206	231
12 inches	168	290	179	205	210
18 inches	143	169	149	160	155

*Data for 1955 only.

Selected lines for preliminary and advanced trials were planted at New Roads, Donaldsonville, and Plaquemines Parish, while advanced seedlings, alone, were grown at Hammond, Chase, Calhoun, and Opelousas.

The plantings in Louisiana, together with the 116 selections in observational, preliminary, and advanced trials at Clark, South Dakota, constituted the 1955 spring Irish potato field trials designated principally for a study of yield and tuber foliage characteristics. Yield data on the Louisiana plantings are given in table 2 for the most promising selections which survived the elimination checks during this year's spring harvest. It is obvious from the small number of selections retained that the elimination was severe. Although some selections in this small group of advanced seedlings will later be eliminated, certain younger seedlings such as 42-54, 42-56, and 32-23 will be coming under closer observations. These newer selections will be subjected to more extensive tests when they are later in the "advanced" selection category in the program.

None of the older red seedlings thus far equals LaSoda and Red LaSoda in yield or other qualities; however, the two most promising seedlings are 82-94, and 12-92. These have been retained for further careful study and final disposition.

Two white seedlings, 91-258, and 91-143, continue to hold a great deal of promise; but since there are a large number of introductions from other stations that have blight and scab resistance, any new white seedling must have some exceptional qualities before its introduction is justified. Seedling 91-258, which was mentioned more fully in our 1955 report, is an oblong russet potato having very desirable baking quality. The other promising white-skinned seedling is 91-143. Its parentage is B 61-3 x Cherokee. It has performed rather consistently in both the northern and southern areas, and shows a high degree of scab resistance. It has high solids and excellent cooking qualities. It is equal to Katahdin or Sebago in yielding ability.

Other advanced white seedlings that are still in the testing stage, and which offer some promise for further study, are 81-113, 91-10, 91-78, 21-367 and 21-382. These white lines carry either blight or scab resistance.

Table 2. Yield of advanced seedlings over a four-year period at Baton Rouge*.

Var. or Sel.	Year				Ave.
	1952	1953	1954	1955	
LaSoda	352	298	188	202	260
Red LaSoda	--	312	203	110	209
Triumph	241	252	166	81	185
Katahdin	--	--	216	122	169
Sebago	--	--	177	30	103
21-367	--	--	--	104	104
21-382	--	--	--	90	90
12-91	--	195	--	76	135
12-92	--	169	213	101	161
91-10	326	268	198	144	233
91-78	286	173	118	102	169
91-143	305	261	135	138	210
91-258	185	193	126	86	147
82-94	270	213	142	142	191
81-113	309	247	82	--	212

*Blank spaces indicate that a seedling or variety was not in yield tests during that year.

Miscellaneous tests were continued this year in regard to: (1) The Effectiveness of certain growth regulators in the control of sprouting of southern-grown potatoes during storage; (2) the relationship between length of rest period and yielding potential of a given variety; (3) the prevention of excessive skinning of tubers by the use of vine killers; and (4) the role of antibiotics in plant growth and disease control.

MAINE

Reiner Bonde, F. J. Stevenson, R. V. Akeley, and D. Merriam

Comparison of Yields, Specific Gravity, and Percentage Dry Matter of
Ring-Rot-Resistant Seedlings and Commercial Varieties

Twenty-three ring-rot-resistant seedlings and two commercially grown varieties were compared in 1955 for yielding ability, specific gravity, and dry matter of the potato tubers.

The potatoes were planted on May 17 and harvested September 25. The foliage diseases and insects were controlled by weekly applications of tribasic copper sulfate and DDT oil emulsion spray mixtures. The potatoes were placed in commercial storage and graded for size and other defects. Specific gravity determinations were made the latter part of November from tuber sample lots from each replicated field plot.

Bonde, table 1, lists the seedlings and varieties included in the experiment, as well as the yields, specific gravity, and percentage dry matter of the tubers.

Kennebec produced the highest yield rate. However, seedlings B 2854-1 and B 721-29 were in the same class and yielded significantly more than the average yields of the experiment at the 1% level. B 911-31 and B 355-24 yielded significantly more than the average yield at the 5% level. Six of the ring-rot resistant seedlings yielded more than Katahdin, the leading variety grown in Maine.

It is important that B 2854-1 and B 721-29 produced tubers with high specific gravity in addition to high yields. Seedlings B 2900-37, B 2117-2 and B 919-28, and Merrimack also produced potatoes with high specific gravity, but the yields were less than for Katahdin.

All the seedlings included in the experiment have desirable tuber shape and foliage characteristics. All have been severely inoculated with viable ring-rot bacteria for the past five or more years with none or very few infected plants developing.

Bonde table 1. Yield, specific gravity, and percentage dry matter for 23 ring-rot-resistant seedlings. Commercial varieties included for comparison.

Pedigree	Parentage	Yield per acre ^{1/}		Dry matter	Specific gravity
		Total	Over 2 in.		
		Bu.	Bu.	Pct.	
Kennebec	B 127 x (X96-56)	710.3 ^{2/}	701.1	20.2 ^{3/}	1.0802 ^{3/}
B 2854-1	B 721 x Furore	673.2 ^{2/}	646.9	20.6 ^{3/}	1.0816 ^{3/}
B 721-29	Earlaine x Teton	663.1 ^{2/}	628.6	19.2	1.0746
B 911-31	055 x Teton	615.8 ^{4/}	596.5	17.7 ^{5/}	1.0682 ^{5/}
B 355-24	96-56 x Saranac	615.3 ^{4/}	606.7	17.9	1.0698
B 3141-3	B 721-29 x Teton	601.9	574.8	18.5	1.0717 ^{6/}
B 3138-3	B 607-56 x Merrimack	600.2	596.0	17.1 ^{6/}	1.0653 ^{6/}
Katahdin	40568 x 24642	574.6	566.6	19.4	1.0759
B 2855-5	B 721-29 x Merrimack	571.9	567.3	18.1	1.0697
B 2900-37	Ontario x Merrimack	564.6	557.8	19.8 ^{3/}	1.0782 ^{3/}
B 2117-2	Sebago x "	562.3	526.9	20.4 ^{3/}	1.0805 ^{3/}
B 2391-14	B 607-56 x "	558.8	551.0	18.5	1.0716 ^{6/}
B 2425-20	B 355-24 x B 446-58	552.9	547.4	16.4 ^{6/}	1.0616 ^{6/}
B 991-14	B 355-24 x B 81-40	548.8	534.5	18.5	1.0724
B 725-37	B 336-184 x Teton	544.7	527.3	18.7	1.0727
B 3116-67	B 503-70 x B 991-13	541.8	540.7	18.1	1.0697
B 766-C	157-9 x Teton	533.8	527.9	18.1	1.0704
B 911-21	055 x Teton	521.5	510.5	19.2	1.0752
B 2900-44	Ontario x Merrimack	491.6	471.0	18.3	1.0706 ^{3/}
B 919-28	B 355-24 x (X792-94)	487.9	478.6	19.8 ^{3/}	1.0784 ^{3/}
Merrimack	96-56 x Saranac	485.2	477.4	20.0 ^{3/}	1.0791 ^{3/}
B 911-2	055 x Teton	473.7	440.5	16.4 ^{6/}	1.0616 ^{6/}
B 2906-13	B 355-24 x B 446-58	429.1	421.8	19.0	1.0742
B 1161-18	Teton selfed	382.9	374.1	18.3	1.0712
B 3182-1	B 991-13 x B 991-3	362.4	355.9	18.1	1.0701
Mean		547.3	533.07	18.6	1.0727
L.S.D. 5%		64.8			.0037
" 1%		85.7			.0050

^{1/} Average of 5 replicated 1-row plots, each 25 feet long.

^{2/} Yields significantly higher than mean at 1% level.

^{3/} Specific gravity significantly higher than mean at 1% level.

^{4/} Yields significantly higher than mean at 5% level

^{5/} Specific gravity significantly lower than mean at 5% level.

^{6/} Specific gravity significantly lower than mean at 1% level.

MAINE

G. W. Simpson, Reiner Bonde and R. V. Akeley

Leafroll Resistant Seedlings

A total of 5,057 tubers, representing 25 crosses and 3 selfed lines, were received from The U.S.D.A. at Beltsville, Md., for testing for leafroll resistance in 1955. In addition to the new introductions and those saved from previous years for retesting, 415 selections from the Chapman Farm were included in the 1955 planting.

As in the past, current-season symptoms of leafroll, following infestation of individual plants with viruliferous green peach aphids, were used to eliminate certain susceptible varieties. In 1955, 180 out of the 4,982 hills growing were saved for retesting. This is a lower percentage (3.6% of the total) than has been saved in recent years.

The results since the 1953 introductions are given in the following 4 tables. The 404 seedlings in table 4 were tested in 5-hill plots. Only 2 selections remained free from virus leaf roll.

Maine table 1. Reaction of progenies of different crosses or selfed lines to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 3 successive seasons, 1953-55.

Pedigree	Parentage	Seedlings planted in 1953 ^{1/}	Replanted		Saved for retesting in 1956
			1954	1955	
B 1383	B 24-58 selfed	214	37	17	7
B 1384	B 784-53 "	172	51	29	12
B 1385	B 859-10 "	66	12	4	3
B 1388	B 2113-9 "	83	12	5	1
B 3388	B 784-53 x Katahdin	236	27	9	2
B 3389	B 784-53 x B 24-58	58	20	11	8
B 3390	B 859-10 x Katahdin	226	32	6	1
B 3391	B 859-10 x B 24-58	347	136	76	32
B 3392	B 2187-25 x Katahdin	178	11	6	1
B 3397	B 2113-9 x B 864-2	286	27	13	1
B 3400	B 24-58 x B 922-3	166	16	6	1
B 3486	B 595-76 x B 24-58	121	8	3	1
B 3490	B 2925-23 x B 24-58	72	24	16	5
B 3393	B 2187-25 x B 24-58	232	44	24	4

^{1/} 24 crosses and 9 selfed lines were introduced in 1953.

Maine table 2. Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculations with viruliferous green peach aphids in each of 2 successive seasons, 1954-55.

Pedigree	Parentage	Seedlings planted in 1954 $\frac{1}{2}$	Replanted 1955	Saved for retesting in 1956
B 3558	B 859-10 x Katahdin	378	35	4
B 3559	B 859-10 x B 24-58	337	149	40
B 3560	B 859-10 x B 784-53	379	110	25
B 3562	B 2946-5 x B 24-58	246	59	21
B 3563	X 927-3 x Katahdin	174	3	1
B 3566	X 927-3 x B 2925-23	75	3	1
B 3568	X 927-3 x B 2963-7	357	9	1
B 3569	X 1276-185 x B 2834-3	132	20	2
B 3570	B 2834-3 x X 927-3	100	5	1
B 3571	Houma x B 2963-7	266	30	1
B 3572	Houma x X927-3	255	11	1
B 3576	B 2946-5 x B 929-32	292	28	3
B 3577	B 2946-5 x B 2968-31	183	20	3
B 3578	Imperia x B 24-58	206	39	12
B 3636	Katahdin x B 1172-14	60	1	1
B 1419	B 24-58 selfed	104	9	1
B 1420	B 2938-22 selfed	346	16	2

$\frac{1}{2}$ 25 crosses and 3 selfed lines were introduced in 1954.

Maine table 3. Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculations with viruliferous green peach aphids in 1955.

Pedigree	Parentage	Seedlings planted in 1955	Saved for retesting in 1956	Surviving the first year's inoculation
		No.	No.	Pct.
B 1468	B 2359-85 selfed	114	4	3.5
B 1470	B 2834-3 O.R.	108	3	2.8
B 1472	B 2962 selfed	53	0	0
B 3802	B 859-10 x B 24-58	236	16	6.8
B 3805	B 2925-38 x B 2938-22	54	5	9.3
B 3806	B 2944-65 x B 24-58	241	4	1.7
B 3808	B 2946-5 x B 24-58	254	12	4.7
B 3809	B 2946 x B 2968-31	218	1	.5
B 3810	B 2962-6 x B 2458	188	3	1.6
B 3812	Katahdin x B 24-58	217	1	.5
B 3815	B 24-58 x B 2834-3	250	15	6.0
B 3816	B 24-58 x B 2963-7	172	5	2.9
B 3821	X 927-3 x B 24-58	351	9	2.6

Maine table 3 continued.

Pedigree	Parentage	Seedlings planted in 1955	Saved for retesting in 1956	Surviving the first year's inoculation
		No.	No.	Pct.
B 3823	X927-3 x B 2834-3	290	5	1.7
B 3824	X927-3 x B 2946-5	306	7	2.3
B 3825	X927-3 x B 2963-7	351	10	2.8
B 3826	X1276-185 x B 24-58	218	31	14.2
B 3827	B 2925-23 x B 24-58	227	37	16.3
B 3830	Houma x B 294-38	116	1	.9
B 3831	B 294-38 x B 2962-6	227	0	0
B 3841	X927-3 x B 3299-13	145	1	0.7
B 3842	B 982-23 x B 294-38	217	0	0
B 3843	B 1172-16 x B 294-38	48	0	0
B 3846	B 2359-84 x B 2938-22	87	5	5.7
B 3847	B 2361-2 x B 2925-38	25	1	4.0
B 3848	B 2361-2 x B 2962-6	49	1	2.0
B 3850	B 2925-23 x B 2361-2	28	2	7.1
B 3851	B 2946-5 x B 2361-2	192	1	.5
		<u>4982</u>	<u>180</u>	<u>3.6</u>

Maine table 4. Reaction of selections of 25 crosses and 3 selfed lines from Chapman Farm to leaf roll infection resulting from artificial inoculation with viruliferous green peach aphids in 1955.

Pedigree No.	Parentage	No. tested	Number hills infected ^{1/}						
			0	1	2	3	4	5	
B 3556	B 595-76 x B 24-58	27	1			1	1		24
B 3557	B 606-37 x B 24-58	57		1			1		55
B 3558	B 859-10 x Katahdin	22				1	1		20
B 3560	B 859-10 x B 784-53	27		1		2	7		17
B 3561	B 2946-5 x Katahdin	34					1		33
B 3562	B 2946-5 x B 24-58	29	1		2		2		24
B 3563	(X927-3) x Katahdin	2							2
B 3564	(X927-3) x B 24-58	7							7
B 3565	(X927-3) x B 2834-3	10							10
B 3567	(X927-3) x B 2946-5	3							3
B 3568	(X927-3) x B 2963-7	1							1
B 3569	(X1276-185) x B 2834-3	2							2
B 3570	B 2834-3 x (X927-3)	2					1		1
B 3571	Houma x B 2963-7	1							1
B 3572	Houma x (X927-3)	7							7
B 3573	B 962-32 x (X927-3)	1							1
B 3576	B 2946-5 x B 929-32	42							42

Maine table 4 continued

Pedigree No.	Parentage	No. tested	Number hills infected ^{1/}					
			0	1	2	3	4	5
B 3577	B 2946-5 x B 2968-31	27						27
B 3600	B 3021-3 x Katahdin	26					1	25
B 3625	Houma x B 1299-15	22						22
B 3633	B 1172-14 x B 24-58	17					1	16
B 3636	Katahdin x B 1172-14	1						1
B 3645	B 595-76 x B 929-32	15						15
B 1420	B 2938-22 selfed	11						11
B 1421	B 2962-6 "	4						4
B 1422	(X927-3) "	1						1
B 3684	(X927-3) x Ac 25953	5						5
B 3685	(X927-3) x 3 VW-9	1						1
	Parents	11	2	1				8

^{1/} Each seedling has 5 plants.

MAINE

Charles E. Cunningham and R. V. Akeley

Potato Variety Trials

The variety yield tests were continued in Maine in 1955 at Presque Isle, Madawaska, and Exeter. The results are given in Cunningham table 1. The Presque Isle test had 6 replications, and the Exeter and Madawaska tests each had 5. All plants were spaced 8 inches apart, except Russet Burbank which was spaced 16 inches and Saco, Cherokee, Merrimack, and Houma which were spaced 10 inches. Fertilizer applications and cultural methods were similar to those of the area in which the tests were planted.

The ability to yield was well demonstrated by Saco, Kennebec, Red Pontiac, and Cherokee at all locations. The yield of Russet Burbank was not so good as the varieties mentioned nor was its percentage total solids any better than Kennebec or Cherokee. Red Pontiac was lowest in total solids and Mohawk, Delus and Saco were highest. Russet Burbank did yield 20 bushels more per acre on an average for all locations than Mohawk but the latter had 2.1% more total solids. Also, Mohawk had 90% of its tubers graded out in the 2- to 4-inch tuber size class, whereas Russet Burbank had only 73% of its tubers weighing 5 ounces or more in a comparable class.

New entries B 3095-18 and B 3299-13 are seedlings highly resistant to leafroll infection in the field. They were obtained from Simpson and Bonde and are the results of many years of testing for leafroll resistance.

Although they were tested in only 1 location their yields and percentage of total solids compare favorably with the commonly grown commercial varieties.

Seedling B 605-10 tended to shatter bruise and had some growth cracks. B 922-6 also had growth cracks. Boone, B 2971-14, B 3095-18, and B 3299-13 had good tuber shape and uniformity.

Cunningham table 1. Yield of tubers above $1\frac{1}{2}$ inches in bushels per acre, percentage between 2 and 4 inches, and percentage total solids, 3 locations in Maine, 1955.

Variety	Presque Isle			Madawaska			Exeter			Mean		
	Over $1\frac{1}{2}$ "	2-4 in.	Total solids	Over $1\frac{1}{2}$ "	2-4 in.	Total solids	Over $1\frac{1}{2}$ "	2-4 in.	Total solids	Over $1\frac{1}{2}$ "	2-4 in.	Total solids
	Bu.	%	%	Bu.	%	%	Bu.	%	%	Bu.	%	%
Saco ^{3/}	668	97.1	20.7	644	95.3	18.4	594	92.9	18.2	635	95	19.1
Kennebec	718	89.8	18.7	613	91.0	17.3	569	94.2	17.2	633	92	17.7
Red Pontiac ^{2/}	732	97.4	16.7	548	94.4	15.2	627	93.3	15.2	636	95	15.7
Rus. Burbank	584	80.0	18.7	535	75.5	--	397	64.8	16.7	505	73	17.6
Mohawk	579	89.3	20.7	496	91.7	19.2	380	90.0	19.2	485	90	19.7
Katahdin ^{3/}	598	93.7	18.7	472	97.3	17.2	392	92.5	17.7	487	94	17.9
Cherokee	625	94.7	19.0	470	94.5	16.9	496	86.4	17.2	530	92	17.7
B 926-9	682	94.2	17.3	450	95.9	15.3	339	86.9	15.7	490	92	16.1
Sebago	621	96.6	17.4	448	97.5	16.7	340	93.0	16.5	470	96	16.9
Plymouth	679	96.8	19.0	412	95.1	17.2	374	94.5	18.7	488	95	18.3
Delus	522	92.3	19.9	376	95.0	19.7	427	91.4	19.2	442	93	19.6
B 605-10 ^{3/}	642	91.6	18.2	360	95.8	16.2	433	94.9	18.2	478	94	17.5
Merrimack	475	96.4	18.9	320	95.3	18.9	303	92.1	17.3	366	95	18.4
B 922-6	449	96.3	18.7	275	92.7	17.4	405	94.5	17.7	376	94	17.9
Pungo	714	92.3	19.7									
Marygold	708	93.3	18.2									
Houma ^{3/}	675	95.0	19.0									
B 3095-18	661	94.0	18.4									
B 3299-13	641	95.1	18.2									
47156	600	93.5	19.7									
B 355-35	596	96.7	17.4									
B 2971-14	594	97.4	18.7									
Boone	582	91.4	16.9									
B 3024-4	394	88.9	19.4									
L.S.D. at .05	67	-	1.2	79	--	.7	99	--	1.0			

- 1/ Percentage weighing 5 ounces or more
 2/ Sixteen-inch spacing between plants.
 3/ Ten-inch spacing between plants.

Samples of the seedlings and varieties grown in the Maine yield trials, at Presque Isle, were stored at 45°F. after harvesting and grading. One month before chipping part of each lot was conditioned at 60 F. On January 1 a fry test was made on all the material. The color range was from class 1 for those with a deep brown, burnt appearance to class 7 for those with a very light tan, almost white color.

Cunningham table 2 gives the results for these tests. Chips in class 4 or higher are usually preferred by the trade. At continuous storage of 45° only B 922-6 and B 2971-14 were rated in class 4, but nearly one-half of the seedlings were rated class 4 or better after 1 month of conditioning at 60°. The response to conditioning at 60° varied markedly. B 2971-14 showed no response, B 355-35 and Mohawk increased 2 classes, and the remaining varieties fluctuated between these groups.

Cunningham table 2. Color of chips stored at 2 temperatures made from 24 potato varieties and seedlings grown at Presque Isle, Maine, 1955.

Variety	Chipping color classes			Variety	Chipping color classes		
	45°	60°	Diff.		45°	60°	Diff.
47156	3.5	4.0	0.5	Houma	2.0	2.7	0.7
B 355-35	2.3	4.2	2.0	Katahdin	3.3	4.6	1.3
B 605-10	2.6	3.2	.6	Kennebec	3.3	3.6	0.3
B 922-6	4.1	4.4	.3	Marygold	1.9	2.6	0.7
B 926-9	3.3	3.9	.6	Merrimack	3.8	4.1	0.3
B 2971-14	4.3	4.3	.0	Mohawk	1.3	3.3	2.0
B 3024-4	3.1	3.3	.2	Plymouth	2.8	4.2	1.4
B 3095-18	2.1	3.3	1.2	Pungo	2.7	4.0	1.3
B 3299-13	3.0	4.3	1.3	Red Pontiac	1.2	1.9	.7
Boone	1.0	1.1	.1	Rus. Burbank	3.1	3.2	.1
Cherokee	3.3	4.2	.9	Saco	3.5	3.7	.2
Delus	3.6	4.1	.5	Sebago	3.3	4.0	.7

1/ Samples at 45° were moved to 60° for one month for conditioning prior to frying.

MARYLAND
Howard S. Potter and Carroll E. Cox

Performance of Certain Disease-Resistant Varieties and Seedlings of
Irish Potatoes with and Without Fungicidal Sprays in Maryland, 1955

The 1955 field tests are a part of a continuing project in which Irish potato varieties and seedlings possessing resistance to certain destructive diseases are compared with standard varieties to determine their suitability for use under Maryland conditions.

Early and late plantings of 19 varieties and seedlings were included in these tests. Plantings were laid out in two adjacent blocks each with four 30-foot single-row plots. Each variety or seedling was randomized once in each plot and plots were replicated 4 times.

One block was sprayed with a fungicide-insecticide mixture (zineb-DDT); the other with the insecticide only. Comparative performance was based on yield and defoliation records.

Seed potatoes used in these tests were Maine- and Maryland- (Salisbury) grown. Those from Maine came from experimental plots of U.S.D.A. and met all requirements for certification, although they were not actually certified. The home-grown seed represented the fourth generation of seed stock from non-rogued plots and was not certified.

All seed was mechanically planted in 32-inch rows and the seed pieces were approximately 1 1/4 inches apart. Fertilizer was applied at time of planting and during the growing season in accordance with the best horticultural practices for the area.

Early Planting. Seed was planted March 15. On May 1 disease and insect control sprays were applied and continued at weekly intervals until harvest. Ten spray applications were made with a power sprayer (approximately 350 p.s.i. at the pump) through an 18-nozzle boom (6 nozzles per row) at the rate of approximately 200 gallons per acre per application.

Early blight was the only foliar disease observed in the early plantings. It appeared in early May and became increasingly serious in the blocks receiving no fungicide and as the plants approached maturity. Cobbler, Sebago, Merrimack, B 2668-11 and B 880-4 in this order were most seriously infected. Only a minimum of early blight damage appeared in the fungicide-sprayed block.

The relative time of maturity of varieties and seedlings was noted where the fungicides were applied. Cobbler, Sebago, Pontiac, and B 880-4 were the first to reach maturity. Marygold, Cherokee, Katahdin, B 2368-11, and

B 751-119 followed within a week. The remaining varieties and seedlings were still partially green at the time of harvest (July 26) particularly Merrimack and Kennebec.

The yields of varieties and seedlings are presented in Maryland table 1. The data show that in the block sprayed with the fungicide, the varieties Pontiac and Kennebec (both Maine-grown seed) produced yields of U.S. No. 1's which were significantly higher than that of Irish Cobbler from Maine-grown seed. Only the variety Pontiac produced a significantly greater yield of U.S. No. 1's than Irish Cobbler (Maine) in the block which received only insecticide.

In both blocks yields from Salisbury-grown Merrimack and Kennebec seed were significantly less than yields from Maine-grown seed of the same varieties. This was also true of Irish Cobbler in the block not sprayed with a fungicide. There was no significant difference between yields from Maryland- and Maine-grown seed of the leaf-roll-resistant seedling X1276-185. However, yields from plots sprayed with fungicides were in general higher than those from plots receiving insecticidal sprays only.

Late Planting was made July 15 and the first sprays were applied August 28, 1955. Eight spray applications were made at weekly intervals from that date until harvest.

The planting suffered severe wind and water damage during August and September. The result stands of all varieties and seedlings were poor, regardless of spray treatment.

The extent of defoliation from early blight was recorded for all varieties and seedlings on two separate dates and is found in Md. table 2. It is evident from these data that the fungicidal treatment gave effective control of early blight. None of the varieties or seedlings appeared to be significantly more tolerant than Irish Cobbler (Maine) to the disease. Cherokee (Maine) and Kennebec (Salisbury), on the other hand, showed significantly less tolerance than Irish Cobbler.

Abnormally wet weather during the month preceding harvest resulted in severe and irregularly distributed damage and for that reason data on yields from the late planting are not considered reliable and are not included in this report.

Maryland table 1. Yields of potatoes in early planting at University of Maryland Vegetable Research Farm, Salisbury, Md., 1955.

Variety or seedling	Fungicide + insecticide 1/ Average yield per acre				Seed source
	US #1 ^{2/}	US #2 ^{2/}	Total	US #1	
	Bu.	Bu.	Bu.	Pct.	
Pontiac	425	37	462	92	Maine
Kennebec	403	13	416	97	"
Pungo	319	9	328	97	"
Marygold	338	29	367	92	"
Katahdin	339	20	359	94	"
Sebago	290	38	327	89	"
Cherokee	336	34	370	91	"
Irish Cobbler	319	27	347	92	"
B 2368-4	371	25	396	94	"
B 2368-11	312	34	346	90	"
B 880-4	256	33	290	91	"
B 605-10	254	18	272	93	"
X 1276-185	259	22	281	92	"
B 751-119	254	36	291	87	"
Merrimack	203	22	224	91	"
Kennebec	176	29	205	86	Maryland
Merrimack	49	8	57	86	"
Irish Cobbler	245	36	281	87	"
X 1276-185	285	27	312	91	"
L.S.D. at 5%	64	12	70		
" " 1%	84	16	87		
Insecticide					
Pontiac	348	17	365	95	Maine
Kennebec	294	11	305	96	"
Pungo	276	13	290	95	"
Marygold	296	18	313	94	"
Katahdin	254	16	270	94	"
Sebago	231	26	257	90	"
Cherokee	301	22	324	93	"
Irish Cobbler	239	39	278	86	"
B 2368-4	358	17	375	95	"
B 2368-11	205	20	225	91	"
B 880-4	235	22	257	91	"
B 605-10	261	14	276	94	"
X 1276-185	228	14	242	94	"
B 751-119	254	19	274	93	"
Merrimack	201	13	214	94	"
Kennebec	153	22	176	87	Maryland
Merrimack	32	6	39	82	"
Irish Cobbler	165	34	199	83	"
X 1276-185	208	25	233	89	"
L.S.D. at 5%	72	11	74		
" " 1%	94	15	97		

1/ Fungicide (zineb 2 lb/100 gal.) plus insecticide (DDT, oil emulsion, 1 qt./100 gal.

2/ U.S. No. 1 and No. 2 equivalent, not officially graded.

Maryland table 2. Foliage scores and percentage of defoliation of sprayed and unsprayed late potato plots at the University of Maryland Vegetable Research Farm, Salisbury, Md., 1955.

Variety or seedling	September 28		October 5		Seed source
	Sprayed defoliation	Unsprayed defoliation	Sprayed defoliation	Unsprayed defoliation	
	Pct.	Pct.	Pct.	Pct.	
Pontiac	12.0	26.5	17.0	31.0	Maine
Kennebec	10.5	26.5	17.0	37.0	"
Pungo	10.5	17.0	12.0	23.5	"
Marygold	10.5	31.0	12.0	26.5	"
Katahdin	10.5	17.0	17.0	23.5	"
Sebago	10.5	26.5	14.0	31.0	"
Cherokee	40.5	56.0	59.5	69.0	"
Irish Cobbler	10.5	23.5	21.0	37.0	"
B 2368-4	14.0	26.5	14.0	31.0	"
B 2368-11	8.5	23.5	14.0	23.5	"
B 880-4	26.5	40.5	31.0	63.0	"
B 605-10	10.5	21.0	17.0	26.5	"
X 1276-185	17.0	17.0	23.5	23.5	"
B 751-119	10.5	21.0	17.0	23.5	"
Merrimack	10.5	23.5	14.0	26.5	"
Kennebec	76.5	88.0	76.5	88.0	Salisbury
Merrimack	8.5	10.5	14.0	14.0	"
Irish Cobbler	10.5	14.0	14.0	23.5	"
X 1276-185	17.0	31.0	21.0	26.5	"
L.S.D. at 5%	7.5	14.5	13.5	18.5	
" 1%	9.5	16.5	16.0	20.0	

MASSACHUSETTS

Karol J. Kucinski and Ralph W. Donaldson

In 1955, 17 varieties of potato were tested for comparative yields at the Massachusetts Agricultural Experiment Station, Amherst, Mass. Each variety was planted in a 50-foot row replicated 4 times. A ton per acre of 5-10-10-2 fertilizer was applied in drill. The plots were sprayed weekly with 50% wettable dithane, 2 pounds per 100 gallons, supplemented with DDT as needed. Tractor and sprayer rows were eliminated since side-arm boom was used for spraying.

In addition to these plots at the University farm, tests were made on three different soil types in the Connecticut River Valley under farmer conditions. The soil types were silt loam, fine loamy sand, and fine sandy loam, respectively, for farms A, B, and C. The 1955 growing season started with dry weather until after tuber set, then the remainder of the season was considered wet. This wet period accounts for the low quality of the various varieties. The results of these trials are given in Mass. tables 1 and 2.

Mass. table 1. Potato variety tests, 1955, University Farm, Amherst, Mass.

Total yield rank	Variety	Yield per acre			Specific gravity	Quality rank
		Size A	Size B	Total		
		Bu.	Bu.	Bu.		
1	Saco	432	15	447	1.0617	7
2	Teton	408	12	420	1.0551	13
3	Katahdin	397	16	413	1.0581	10
4	B 2368-4	376	32	408	1.0606	8
5	Kennebec	348	18	366	1.0606	8
6	B 355-44	320	31	351	1.0566	11
7	Plymouth (B73-10)	325	16	341	1.0622	6
8	B 2368-11	316	24	340	1.0461	16
9	Sebago	314	16	330	1.0531	14
10	Gr. Mountain	296	18	314	1.0667	2
11	Pungo	296	17	313	1.0626	5
12	NC 880-4	284	14	298	1.0520	15
13	Cherokee	251	23	274	1.0648	3
14	Delus	250	9	259	1.0704	1
15	I. Cobbler	217	15	232	1.0646	4
16	Russet Burbank	177	25	202	1.0598	9
17	Osage	119	13	132	1.0560	12

Mass. table 2. Tests on 3 different soils on 3 different farms in Connecticut River Valley.

Variety	Farm A		Farm B		Farm C	
	Silt loam		Fine loamy sand		Fine sandy loam	
	Total yield per acre	Quality rank	Total yield per acre	Quality rank	Total yield per acre	Quality rank
	Bu.		Bu.		Bu.	
Gr. Mountain	274*	--	65*	3	431	3
Osage	85	5	75*	-	56	8
Pungo	307	4	203	4	482	4
Saco	508	3	194	6	499	5
Merrimack	261	2	244	1	457	2
Delus	261	1	162	2	382	1
I. Cobbler	419	6	169	8	198	9
Russet Burbank	169*	-	36*	-	351*	5
18" spacing						
Russet Burbank						
8" spacing	--	-	73*	-	238	5
Katahdin	363	7	247	7	300	7
Russet Rural	--	-	--	-	295	6

*Mostly culls, #2 and misshapen.

MASSACHUSETTS
Robert A. Mullany
Eastern States Farmers' Exchange

1955 Potato Test Plots

Four tests were planted in Eastern States territory in 1955; 3 in widely scattered locations in Pennsylvania and 1 in Massachusetts. Unfortunately, the Massachusetts tests was lost in the August flood, so the data herein contained is from the tests in Pennsylvania. Each planting was located in a commercial grower's potato field and treated culturally as his own. The experimental design was the randomized complete block with 4 replications at each location. Individual plots consisted of one 25-foot row with a 10-inch spacing between plants. Rows were spaced 24-inches apart. The following 3 paragraphs give the plot locations and the fertilizer and cropping practices followed by each cooperator.

The Fred Oswald farm is located in New Tripoli, northeast Pennsylvania, and has a shaly loam soil. Previous year's crop was sod in a potato-wheat- sod rotation. Ten tons of manure per acre was plowed down with the sod and 1,000 lbs. per acre 8-16-16 was applied with the planter. These trials were planted May 13 and dug November 3.

The farm of Richard Zook is in Manheim in southeastern Pennsylvania. Soil type is the heavy loam common in the Lancaster area. Previous crop was barley, preceded in 1953 by tobacco. 1,900 lbs. per acre of 4-12-12 fertilizer was applied with the planter. This test was planted May 12 and harvested October 22.

The town of Ebensburg in western Pennsylvania is the location of the Fred Bloom farm. The plot soil type was stony loam. A mixed sod of legumes and orchard grass was plowed down after a topdressing of 10-ton-per-acre of manure. 8-16-16 fertilizer at the rate of 1,000 lbs. per acre was applied with the planter. The planting date was May 27 and the harvest date October 20.

With the exception of a 3-week dry spell early in September, the Bloom plot had fairly adequate moisture. On the other hand, the Oswald and Zook plots were subjected to severe weather conditions during the growing season and this shows clearly in columns showing the percentage of US #1's. The Oswald test had a total of 1.8 inches of rain from June 14 to August 6 and 11.44 inches the following 7 days. From July 1 to August 8 there were 11 days with a maximum temperature of 100°F or more, with the lowest maximum for the period being 86°F. The Zook plot was subjected to much the same conditions, with 0.6 inches of rainfall from June 27 to August 6, followed by 11.47 inches in the succeeding 2 weeks, and 28 days of temperatures of 90° F. or higher during the dry spell. These conditions resulted in a much higher percentage of small and misshapened tubers at the latter two locations.

The USDA was the source of the four seedlings and Canso and Delus. The Green Mountain selection was provided by William Humason of Wiscasset, Maine, the result of a private potato-breeding project. The three stocks of Katahdins had varying percentages of infection with virus X, samples A, B, and C having 0.7%, 42%, and 79% virus X content, respectively.

Seedling NC880-4, recently released as Boone, showed to good advantage in yield and percentage U.S. #1, but seemed inclined to "feather" easily and could be of better quality. Delus remains outstanding in quality, but did not maintain type as well as in previous years. The Katahdin entries displayed their ability to yield under adverse conditions. Seedling B 922-6 was apparently too early to take any advantage of the late rains.

The data for yield and percentage total solids for 12 potato varieties grown at 3 locations are found in Eastern States table 1.

Eastern States table 1.

Variety	Locations in Pennsylvania											
	Ebensburg Bloom Farm			New Tripoli Oswald Farm			Manheim Zook Farm			Averages		
	Total yield per acre	Over 1 7/8" free from off shapes	Solids	Total yield per acre	Over 1 7/8" free from off shapes	Solids	Total yield per acre	Over 1 7/8" free from off shapes	Solids	Total yield per acre	Over 1 7/8" free from off shapes	Solids
	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.
Katahdin A	359	85	18.9	594	66	18.2	468	74	18.2	474	75	18.4
" B	248	81	18.2	561	68	17.5	454	72	17.8	421	74	17.8
" C	250	77	17.5	481	63	17.6	450	76	18.1	394	72	17.7
B 922-6	302	79	17.8	169	41	15.4	297	31	17.6	256	50	16.9
Boone												
(NCB880-4)	417	88	18.0	502	71	15.5	567	63	16.7	495	74	16.7
Delus	333	92	22.6	416	65	18.6	550	57	20.2	433	71	20.5
Rus. Sebago	364	85	18.9	520	57	17.4	419	69	17.6	434	70	18.0
Cobbler	583	83	20.1	312	42	16.8	543	41	17.4	479	55	18.1
Plymouth												
(B73-10)	349	85	18.9	293	48	16.5	391	54	16.1	344	62	17.2
B 962-3	333	85	21.9	291	49	18.1	419	66	18.4	348	65	19.5
Canso	278	77	18.5	424	54	18.1	442	72	18.4	381	68	18.3
(Gr. Mountain)												
(selection)	392	75	20.9	504	40	18.7	446	61	17.9	447	59	19.2
L.S.D. 5%			1.25			.96			1.13			.63

MEXICO

John S. Niederhauser,^{1/} Javier Cervantes,^{2/} and Carl J. Eide^{3/}

Report on 1955 Toluca (Mexico) Field Test for Late Blight Resistance of
Seedlings Sent by F. J. Stevenson^{4/}

During the 1955 season, 3,281 seedlings, representing 74 families, were sent to us by F. J. Stevenson for field testing for late blight resistance at Toluca, Mexico. These seedlings were planted May 31 to June 1 at the Santa Elena Agricultural Experiment Station at Toluca. Fertilizer of a 6-12-6 formula was applied at the time of planting at the rate of 1 ton per hectare. No fungicide was applied, but regular insecticide treatments were made, using DDT and parathion.

The same scale used in previous years was employed to evaluate the late blight infection: 0, no infection; 1, very few lesions (1-5); 2, slight infection; 3, moderately blighted; 4, severely blighted; and 5, dead.

Following is a brief chronologic record of the progress of late blight in the plots.

July 5: Late blight was first observed in the plots. Due to a relatively dry June, blight was somewhat tardy in its appearance, and progressed rather slowly (for Toluca) during the first part of July.

July 21: Late blight was estimated to be slight to moderate (2-3 reading) in the checks (Erdgold and Alpha), with little or no blight in the seedling population.

Aug. 4: The checks were severely blighted or dead (4-5 reading); nearly all of the seedlings had at least a few blight lesions, and some were moderately blighted (3 readings).

Aug. 11: All checks were completely dead; all seedlings were blighted, for the most part moderately (3 reading) or severely (4 reading).

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4/ Paper No. 42 in the Agricultural Journal Series of The Rockefeller Foundation.

Aug. 19-25: The final readings were taken during this time. Only 1 plant in the entire plot was given a reading of "2"; 185 seedlings were read as "moderately blighted" or "3". All the rest (94.3%) were very severely blighted or dead. As in previous years certain families of seedlings had a much higher percentage of plants with field resistance than others.

After the final readings were made, we compiled the following list of families with more field resistance than others (ranked in the order of the percentage of plants that show "field resistance," i.e., a reading of 3 or better):

Our No.	F.J.S. No.	Parentage	Plants with "field resistance"(reading "3")
			Pct.
1. US-214	B 3978	3 VW-9 x Ac 25953	23.9
2. US-201	B 3958	Ac 25953 x B 2938-22	20.6
3. US-199	B 3955	Ac 25953 x Cherokee	17.3
4. US-261	B 1483	Ac 25953 Selfed	16.9
5. US-225	B 3991	B 24-58, x Ac 25953	12.7
6. US-190	B 3877	Ac 25953 x B 766-55	12.5
7. US-202	B 3960	Ac 26953 x Ac 25976	12.4
8. US-222	B 3988	Katahdin x Ac 25949	8.5
9. US-224	B 3990	B 24-58 x Ac 25949	8.0
10. US-200	B 3956	Ac 25953 x Katahdin	7.1
11. US-215	B 3979	3 VW-9 x Ac 25955	6.1
12. US-223	B 3989	B 922-3 x Ac 25949	5.5
13. US-220	B 3986	3 XR-1 x Ac 25953	5.3
14. US-204	B 3963	Ac 25955 x Ac 25976	4.7

The clones Ac 25953 and Ac 25949 have been noted as sources of field resistance in previous years and are again outstanding for this characteristic. In 1955 1 or the other of these 2 clones was a parent in 11 of the 14 families showing the most "field resistance" (see list above). Although in the field it was not possible to keep detailed notes on the performance of individual plants, it was noted that the performance of certain families was characteristic. Not only did some have a higher percentage of plants with field resistance (see list above), but the actual course of infection was different. The individuals in certain families were sharply segregated early in the season, with some plants completely free from blight, while others were severely infected. Later, the blight-free individuals in these families became infected, and quickly died. It is suspected that the earlier escapes remained free from blight only because the races necessary to attack them had not yet become prevalent. Once the required race of the pathogen was established the plants promptly died. In families of this kind (examples are US 191, US 193, US 262, US 265) there were few individual selections made for field resistance.

On the other hand, there were a number of families in which the infection was more moderate from the beginning, with few plants killed outright. As the season progressed these plants blighted more gradually, and though the great majority eventually were severely blighted or died, there were a

number of individuals that persisted and showed moderate levels of field resistance. It was in these families (examples are US 199, US 200, US 201, US 202) that the greatest number of selections were made.

Summary of Results of 1955 Toluca Field Test for Late Blight Resistance
USDA material sent by F. J. Stevenson)

Our No.	F.J.S. No.	Parentage	Blight reaction in field			Resist. Pct.
			<u>2</u>	<u>3</u>	<u>4-5</u>	
US 189	B 3864	3 XE-1 x B 355-24		1	261	0.4
US 190	B 3877	Ac 25953 x B 766-55		6	42	12.5
US 191	B 3878	Ac 25955 x Teton		2	68	2.9
US 192	B 3880	Ac 25953 x B 355-35			50	0
US 193	B 3881	Ac 25953 x B 766-55			30	0
US 194	B 3947	Katahdin x Ac 25976			50	0
US 195	B 3949	B 355-24 x "			48	0
US 196	B 3950	B 595-76 x "			51	0
US 197	B 3951	B 606-37 x "		1	92	1.1
US 198	B 3953	B 2962-6 "			103	0
US 199	B 3955	Ac 25953 x Cherokee		18	86	17.3
US 200	B 3956	" x Katahdin		12	157	7.1
US 201	B 3958	" x B 2938-22		22	85	20.6
US 202	B 3960	" x Ac 25976		25	177	12.4
US 203	B 3961	Ac 25955 x B 922-3			22	.0
US 204	B 3963	" x Ac 25976		4	82	4.7
US 205	B 3964	Ac 25960 x B 929-32		4	150	2.6
US 206	B 3965	Ac 25975 x (X 96-56)			34	.0
US 207	B 3966	" x B 3129-24			9	.0
US 208	B 3967	" x Ac 25949			53	.0
US 209	B 3968	" x Ac 25976			33	.0
US 210	B 3972	HLT-4 x Katahdin			19	.0
US 211	B 3973	HSO-2 x Ac 25976			17	.0
US 212	B 3974	3 VW-9 x Katahdin		1	49	2.0
US 213	B 3976	" x B 355-24		1	55	1.8
US 214	B 3978	" x Ac 25953		28	89	23.9
US 215	B 3979	" x Ac 25955		3	44	6.4
US 216	B 3980	" x Ac 25956		3	113	2.6
US 217	B 3981	3 NC-9 x B 2359-84			14	.0
US 218	B 3983	3 XR-1 x 3 VW-9			82	.0
US 219	B 3984	" x B 922-3		1	34	2.9
US 220	B 3986	" x Ac 25953	1	6	124	5.3
US 221	B 3987	" x Ac 25976			89	.0
US 222	B 3988	Katahdin x Ac 25949		15	161	8.5
US 223	B 3989	B 922-3 Ac 25949		6	104	5.5
US 224	B 3990	B 24-58 x Ac 25949		4	46	8.0
US 225	B 3991	" x Ac 25953		8	55	12.7
US 226	B 4007-1	1512 d (11) x 1306 a (2)			1	.0
US 227	B 4007-2	"			1	.0
US 228	B 4007-3	"			1	.0

Our No.	F. J. S. No.	Parentage	Blight reaction in field			Res. Pct.
			<u>2</u>	<u>3</u>	<u>4-5</u>	
US 229	B 4007-4	1512 d (11) x 1306 a (2)			1	.0
US 230	B 4007-5	"			1	.0
US 231	B 4007-6	"			1	.0
US 232	B 4007-7	"			1	.0
US 233	B 4007-8	"			1	.0
US 235	B 4007-10	"			1	.0
US 236	B 4007-11	"			1	.0
US 237	B 4007-12	"			1	.0
US 238	B 4007-13	"			1	.0
US 239	B 4007-14	"			1	.0
US 240	B 4007-15	"			1	.0
US 241	B 4007-16	"			1	.0
US 242	B 4007-17	"			1	.0
US 243	B 4007-18	"			1	.0
US 244	B 4007-19	"			1	.0
US 245	B 4007-20	"			1	.0
US 246	B 4007-21	"			1	.0
US 247	B 4007-22	"			1	.0
US 248	B 4007-23	"			1	.0
US 249	B 4007-24	"			1	.0
US 250	B 4007-25	"			1	.0
US 251	B 4007-26	"			1	.0
US 252	B 4007-27	"			1	.0
US 253	B 4007-28	"			1	.0
US 255	B 4007-30	"			1	.0
US 256	B 4007-31	"			1	.0
US 257	B 4007-32	"			1	.0
US 258	B 4007-33	"			1	.0
US 259	B 4007-34	"			1	.0
US 261	B 1483	Ac 25953 selfed		14	69	16.9
US 262	B 3875	OB 3031-1 x B 3139-24			155	.0
US 263	B 3882	B 381-2 x B 2368-4			22	.0
US 264	B 3883	B 874-35 x B 2997-9			6	.0
US 265	B 3885	B 2131-3 x B 3167-28			33	.0
Totals			1	185	3,095	5.7

MICHIGAN

Donald R. Isleib

1955 Over-State Potato Variety Trials

Six potato variety trials were conducted in Michigan during the 1955 growing season. The results of these trials are summarized in Mich. tables 1-3 for which a brief explanation is offered.

The trials are conducted to determine the relative quality standings of the entries as well as to test their yields. For this purpose specific gravity data and notes on alcohol color and internal appearance are included. The external quality, or appearance, is described. This characteristic is a primary influence on consumers' choice in retail markets.

The six locations were commercial potato fields representative of the general area of production indicated by the county names. Planting and harvesting were done by Farm Crops and Soils personnel, but the cooperators were in complete charge of all other cultural practices, which were identical to those used in their own crops. The Emmet County potato crop in general was a failure because of drought, and the variety trial in that county suffered correspondingly. The Arenac County plots were very wet soon after planting, and further damaged by cultivation shortly after emergence. It is probably incorrect to compare results from these locations on an absolute basis, but they are included for relative comparisons and as an indication of performance under adverse conditions.

Yield and specific gravity data from the trials on mineral soils are summarized in table 1. The yield of potatoes above $1\frac{7}{8}$ " is reported in bushels per acre regardless of grade defects. The notes for each individual variety must be used as an indication of grade quality for these samples.

The results of two trials on organic soils are given in table 2; yields are U.S. No. 1. A comparison of the response to chloride and sulfate salts of potassium as potash carriers was made on the organic soils. No difference in yield between the two was found, but specific gravity of potatoes supplied with K_2SO_4 was higher than that of KCl-fertilized potatoes.

Analysis of variance showed the existance of real differences between average solids and specific gravities as indicated by the L.S.D.'s given in the tables. Wide differences also occurred between locations. These differences are expected from the diversity of environments existing between the several trials. The variety x location interaction was not significant for the mineral locations, indicating that the relative ranking of the varieties in order of average yield was not greatly different from the relative ranking in the individual trials.

Mich. table 1. Yield and specific gravity of potatoes grown in variety trials on four mineral soils in 1955.

Variety	Montcalm		U. P.		Emmett		Bay		Average	
	Yield	Total	Yield	Total	Yield	Total	Yield	Total	Yield	Total
		solids		solids		solids		solids		solids
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
Red Lasoda	491	14.7	476	17.5	126	13.8	246	15.2	335	15.1
Merrimack	414	18.9	400	21.4	120	14.3	135	17.3	267	17.9
Redkote	301	15.1	421	18.0	118	12.2	224	13.0	266	14.5
1363	294	14.0	404	16.9	122	13.6	227	14.5	262	14.7
Redburt	323	14.0	391	16.5	147	12.6	208	14.3	256	14.3
Early Gem	267	14.3	357	16.3	96	12.4	289	13.6	252	14.0
Pungo	336	15.1	384	19.7	114	13.6	156	15.5	248	16.0
Saco	350	17.4			130	13.8			240	15.3
I. Cobbler	273	16.0	364	18.6	109	14.9	205	15.7	238	16.2
Waseca	210	13.8	336	16.0	116	12.2	272	13.6	234	13.8
Ia 961-1	226	15.6	390	17.5	101	17.2	215	17.2	233	16.9
Sheridan	258	15.1	404	19.2	70	15.7	188	16.5	230	16.9
Dazoc	214	13.8	391	17.5	95	13.6	217	15.7	229	15.1
Rushmore	232	14.0	348	18.0	97	14.9	179	15.3	214	15.5
Ia 803-3	230	16.7	324	18.4	94	15.7	200	16.7	212	16.9
Sebago	249	15.7	334	19.2	74	13.6	179	15.3	209	16.0
Osage	158	15.3	268	19.7	106	14.1	260	13.8	198	15.5
Cherokee	153	15.3	317	19.7	100	14.0	219	16.9	197	16.5
Delus	240	16.5			133	17.3			188	16.9
Average	275	15.3	366	17.9	109	14.1	213	15.3	237	15.5
L.S.D. .05	144	1.4	74	-	NSD	1.4	NSD	1.0	42	1.2
.01	108	2.0	99	-		1.8		1.4	56	1.8

Mich. table 2. Yield and specific gravity of potatoes grown in variety trials on two muck soils in 1955.

Variety	Yield U.S. #1	Total solids	Yield U.S. #1	Total solids	Yield U.S. #1	Total solids
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
Ia 803-3	98	16.2	592	14.3	345	15.3
Ia 961-1	94	16.7	492	15.7	293	16.2
Rushmore	68	16.0	483	17.4	275	16.7
Waseca	110	14.5	407	13.8	259	14.1
Sebago	76	16.5	386	18.4	231	17.4
Merrimack	109	17.4	292	19.4	200	18.4
Pungo	92	15.3	247	14.1	170	16.5

(continued)

Mich. table 2 continued

Variety	Yield U.S. #1	Total solids	Yield U.S. #1	Total solids	Yield U.S. #1	Total solids
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
Cherokee	51	16.9	156	17.2	104	16.9
Red LaSoda	120	13.8	83	15.5	102	14.7
Redburt	64	13.6	128	12.6	96	13.0
Irish Cobbler	72	15.3	117	15.7	94	15.5
Dazoc	82	15.7	98	13.6	90	14.5
Early Gem	27	13.6	146	13.2	87	13.4
Sheridan	44	15.3	128	15.1	86	15.1
Osage	49	16.2	101	14.9	75	15.7
1363	67	14.1	62	13.8	64	14.0
Saco	100	17.2				
Delus	61	18.7				
Redkote	60	14.1	245	14.3	157	14.1
Average	76	15.5	245	15.1	160	15.3
L.S.D. .05	43	.8	159	1.2	77	1.0
.01	58	1.2	213	1.6	102	1.4

Mich. table 3. Notes on the appearance, internal characteristics, and alcohol color of potatoes grown in variety trials during 1955.

Variety	Darkening	Internal Defects	Appearance
Red LaSoda	Mod-Sev.	Vascular discoloration	Rough, deep eyes, gr. cracks; 2nd growth; deep scab.
Merrimack	"	Internal necrosis	Slightly rough, deep eyes, some 2nd growth, slight scab-bright skin.
Redkote	Sl-Mod	Slight vascular discoloration	Fairly uniform, gr. cracks, 2nd growth, moderate scab, poor red color.
1363 (Onaway)	Sl-Sev	do	Rough, deep eyes, some growth cracks, scab-bright skin on mineral soil.
Redburt	Sl-Sev	do	Rough, deep eyes, gr. cracks, severe scab, poor red color.
Early Gem	None-Sl	Very few	Rough, gr. cracks, 2nd growth, moderate scab.
Pungo	Sl	Vascular discoloration and hollow heart	Rough, deep eyes, gr. cracks, 2nd growth, moderate scab.
Saco	Mod-Sev	Slight vascular discoloration	Rough, deep eyes, gr. cracks, 2nd growth, moderate scab.
I. Cobbler	Sl.	Very few	Rough, deep eyes, gr. cracks, 2nd growth, moderate to severe scab.

Mich. table 3 continued.

Variety	Darkening	Internal Defects	Appearance
Waseca	Mod	Vascular discoloration	Rough, deep eyes, scab, poor red color.
Ia 961-1	None	do	Smooth, uniform, bright, slight scab, very attractive.
Sheridan	Very slight	Slight vascular discoloration	Fairly uniform & smooth, deep eyes, moderate to severe scab, fair red color.
Dazoc	Slight	Vascular discoloration	Rough, deep eyes, severe scab, ave. red skin.
Rushmore	Moderate	Severe internal necrosis	Fairly uniform, severe scab, good russet skin.
Ia803-3	Moderate	Vascular discoloration	Smooth, uniform, shallow eyes, some sunburn, very little scab.
Sebago	Slight	Slight int. necrosis	Smooth, uniform, shallow eyes, slight scab-bright skin.
Osage	Mod-Sev.	Slight hollow heart	Very variable in form, some gr. cracks and 2nd growth, slight scab, bright skin.
Cherokee	Slight	Extreme vascular discoloration	Rough, deep eyes, gr. cracks, 2nd growth, slight scab & bright skin.
Delus	Slight	Slight vasc. discoloration, hollow heart.	Rough, deep eyes, gr. cracks, 2nd growth, severe scab.

MICHIGAN

H. C. Moore, E. J. Wheeler, N. R. Thompson, W. J. Hooker
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Seed and Seedling Production in Greenhouses

Seed Production.

Forty selections were used as parents for seed production in 1955. Of these 19 were known to transmit resistance to scab, late blight, and virus X and produced the bulk of the seed. The additional 21 parents were used sparingly until progeny testing proves their value. A total of 62 different crosses were made to produce 100,000 seeds. All crosses, except those transmitting leaf roll resistance, combined resistance to scab, late blight, and virus X in at least one parent.

Seed Production and Testing for Disease Resistance.

In June, July and August 63,600 seeds were planted. Where applicable, the seedlings were screened for both virus X and late blight. Approximately 15,000

individuals survived these tests. The surviving seedlings were transplanted into #2 plastering sand in 3.5-inch pots. Nutrients were supplied in water 4 times per week.

Tubers averaging $1\frac{1}{2}$ in. in diameter were harvested in October and November to be planted in the scab nurseries at the Lake City Experiment Station (mineral soil) and the M.S.U. Muck Farm (organic soil).

Seedlings were tested for resistance to leaf roll after transplanting from the flats. For these tests two cages 12' x 24' x 6' were used to confine aphids raised on leaf-roll-infected Datura stramonium. Viruliferous aphids were shaken from the Datura plants onto the transplanted seedlings. The seedlings were exposed to infection over a 2 weeks period. Approximately 4,000 seedling plants from the Michigan program and 1,700 selections from F. J. Stevenson were tested for leaf roll resistance.

Field Testing

Of seedlings produced in the greenhouse in 1954 14,000 were planted in the scab nurseries at Lake City and the M.S.U. Muck Farm. Selection was based on resistance to scab/^{and} horticultural characteristics, and 85 seedlings were retained on the mineral soil and 128 on the muck soil.

From advanced seedlings indexed in the greenhouse 598 were planted at East Lansing, Lake City, and on the Muck Farm. The plot at East Lansing was planted early in May in tuber units, rigidly rogued, and sprayed for seed maintenance. Vines were killed and the plots were harvested August 1, to minimize insect transmission of diseases.

Selections from Lake City and the Muck Farm were evaluated for horticultural characteristics, specific gravity, after cooking darkening, etc, and 190 were retained for further testing. Of the most advanced lines 12 will be included in the replicated seedling yield trials in 1956.

Seedling 1363 has been named Onaway. It has been tested extensively in Michigan for the past 10 years and in the North Central States uniform seedling tests the past 4 years. The outstanding performance of this seedling is high yield, scab resistance, and freedom from internal necrosis. Growers who have grown it for the early market find it superior in yield to any other early variety.

Twenty-two acres of seedling 1363 (Onaway) passed field inspection requirements of the Michigan Crop Improvement Association in 1955. Nearly 3,000 bushels of the crop were sold to plant table stock acreage in the Bay City area and approximately 1,200 bushels were saved to plant for inspection and certification in 1956. Certified seed of 1363 (Onaway) should be available for distribution in the fall of 1956. 2

Over-State Variety Trial

The varieties shown in Michigan table 3 were tested in 6 locations, 4 on mineral soil and 2 on muck. The figures shown are yield of 1 7/8" and above for mineral soils, and yield of U.S. No. 1 for muck. When appearance, freedom from internal defects, and alcohol color ratings were considered with yield and specific gravity, the outstanding entries were Sebago, the seedlings Ia 803-3 and Ia 961-1, and Merrimack. Michigan's 1955 crop year was unusually dry, and several of the locations were severely influenced by drought. The average yield per acre for the State was 162 bushels compared with 195 bushels in 1954.

Some of the varieties may have been at greater disadvantage than others, and some of those which seem to have performed far below expectations will be included in subsequent trials.

Mich. table 3. Yield and specific gravity of potatoes in Michigan over-State variety trial, 1955.

Variety	Mineral soil 1/		Variety	Organic soil 2/	
	Yield per A	Sp.Gr.		Yield per A.	Sp.Gr.
	Bu.			Bu.	
Red LaSoda	335	1.059	Ia 803-3	345	1.060
Merrimack	267	1.072	Ia 961-1	293	1.064
Redkote	266	1.056	Rushmore	276	1.066
1363 - Onaway	262	1.057	Waseca	259	1.054
Redburt	256	1.055	Sebago	231	1.070
Early Gem	252	1.053	Merrimack	200	1.074
Pungo	248	1.063	Pungo	170	1.065
Saco	240	1.060	Redkote	157	1.054
Irish Cobbler	238	1.064	Cherokee	104	1.067
Waseca	234	1.052	Red LaSoda	102	1.057
Ia 961-1	233	1.067	Redburt	96	1.048
Sheridan	230	1.066	Irish Cobbler	94	1.061
Dazoc	229	1.059	Dazoc	90	1.056
Rushmore	214	1.061	Early Gem	87	1.050
Ia 803-3	212	1.067	Sheridan	86	1.059
Sebago	209	1.063	Osage	75	1.062
Osage	198	1.061	1363	64	1.053
Cherokee	197	1.065			
Delus	188	1.067			
L.S.D. .05	42	0.006		77	0.005
.01	56	0.009		160	0.007

1/ Means of 4 locations.

2/ Means of 2 locations.

MINNESOTA

F. A. Krantz, Carl J. Eide, Florian Lauer,
and Kenneth Knutson

The usual potato-breeding work, as described in previous reports, was continued in 1955 along essentially the same lines as before. Special studies were made of the inheritance of field resistance to late blight and its association with late maturity; these are summarized herewith.

Field Resistance to Late Blight

In 1955 a test was made to determine the amount of field resistance present in the breeding material. The test consisted of 526 clones having none of the R genes for immunity and 433 clones having either the R_1 or R_2 genes. The test also included clones with both the R_1 and R_2 genes. The latter are completely immune to the late blight races found in Minnesota and supplied no information about field resistance.

The test was planted on May 23 at the Potato Breeding Farm at Castle Danger, and inoculated on July 8 with races 0 (A), 1,4 (BD), and 2,4 (BC) of Phytophthora infestans. The first lesions appeared 6 days later. On the seventh day after inoculation the presence or absence of lesions on the clones was recorded. On August 4, 26 days after inoculation, notes were made on the percentage of green foliage remaining on each clone. Similar notes were taken again 33, 40, and 54 days after inoculation.

A complete record of the 959 clones would be confusing. The field resistance found in each of the 3 groups (1-no R genes present, 2- R_1 genes present, and 3- R_2 genes present) can be shown by taking illustrative samples from each group.

Clones with no R genes present

The range of field resistance found in group 1 is shown in Krantz table 1. Chisago and 56-1 are typical of the response of all varieties and clones of this group that were as early or earlier than Red Pontiac. About 50% of the 526 clones in this group were in this maturity range. In the late-maturing clones some had field resistance in the range of Red Pontiac, Sebago, and President. None were found that approached the field resistance of the 3 European varieties Voran, Alpha, and Ostbote. Conditions were favorable for development of late blight during the first 40 days after inoculation, but after that the new growth on the long-season European varieties was greater than the loss from late blight.

Krantz table 1. Field resistance in clones having no R₁ immunity genes.

Clone or variety	Days after inoculation					Maturity ^{2/} rating	
	7	1/	26	33	40		54
	Infection		Green foliage				
			Pct.	Pct.	Pct.	Pct.	
56-1	+		10	0	0	0	2
Chisago	+		5	0	0	0	4
Red Pontiac	+		60	40	10	5	5
Sebago	+		70	30	5	0	7+
President	+		90	20	10	5	7+
Alpha	+		95	70	40	50	7+
Voran	+		95	80	50	75	7+
Ostbote	+		95	90	70	90	7+
Green Mountain	+		40	20	5	0	7
Russet Rural	+		30	0	0	0	10

1/ +, Lesions present; 0, no lesions found

2/ Rating 1 to 10. 1, early; 10, late.

Field resistance in clones with the R₁ immunity gene.

Field resistance to late blight races to which they are non-immune, i.e. non-hypersensitive, is common in both early and late clones having the R₁ gene. This is shown in Krantz table 2. The degree of resistance varies with the different clones. Clone 96-56 has some initial resistance but is susceptible later in the season. A fairly high resistance is indicated in clone 96-56-111 which is duplex for the R₁ gene. Minn. 355 is extra early, simplex for the R₁ gene, with relatively high field resistance.

Krantz table 2. Field resistance in clones having the R₁ immunity gene.

Clone or variety	Days after inoculation					Maturity ^{2/} rating	
	7	1/	26	33	40		54
	Infection		Green foliage				
		Pct.	Pct.	Pct.	Pct.		
96-56	+	90	30	5	0	4	
96-56-153	0	80	30	0	0	4	
96-56-203	0	80	30	5	5	5	
96-56-111	0	90	80	50	25	7	
96-56-23-1	0	60	10	0	0	1	
96-56-22-1	+	90	80	60	15	-	
Minn. 355	0	98	90	60	5	2	
Minn. 358	0	98	90	40	5	4	
Cherokee	+	95	40	30	5	5	
Kennebec	+	95	70	60	25	6	

1/ +, lesions present; 0, no lesions found

2/ Rating 1 to 10. 1, early; 10, late.

Field resistance in clones having the R₂ immunity gene

The data in table 3 indicate that extra early clones, having the R₂ gene obtained from TI-5, may have a high degree of field resistance to race P. infestans to which they have no hypersensitive resistance. The clone TI-5 has a perceptible amount of field resistance. A cross between TI-5 and the susceptible clone 56-1 (see table 1) produced 58-2, an extra early clone with about the same initial resistance as that of TI-5. By selfing 58-2 early and extra early R₂ clones were obtained which range from the relatively high field resistance shown by 58-2-4 to practically no field resistance shown by 58-2-5.

Krantz table 3. Field resistance in clones having the R₂ immunity gene.

Clone or variety	Days after inoculation					Maturity rating ^{2/}
	7	1/	26	33	40	
	Infection		Green foliage		54	
			Pct.	Pct.	Pct.	Pct.
TI-5	+		60	20	5	5
58-2	+		70	10	0	0
58-2-1	+		90	20	5	5
58-2-2	+		80	20	10	0
58-2-4	0		80	80	70	5
58-2-5	+		10	0	0	0

1/ +, lesions present; 0, no lesions found

2/ Rating 1 to 10. 1, early; 10, late.

Discussion

Clones and varieties without the R immunity genes which have been reported to have field resistance to late blight are mostly, if not all, late, long-season clones. A study of the amount of this resistance that could be combined with genes for early maturity would be worth while. One of the high field-resistant European varieties or one of the more highly resistant Andigenum clones could be used as the source of resistance.

The field resistance in clones with the R immunity genes seems equal to that of the German varieties. This protection appears to be as effective in extra early, short-season clones as in the long-season clones. In both the R₁ and R₂ clones a range from very low to very high field resistance was found in simplex R clones. This indicates that the R genes do not by themselves give high field resistance, though they may be an essential part of the gene interaction producing this resistance.

The R genes provide the easiest method of obtaining protection to late blight. Clones with the R₁R₂ combination are immune to the races found thus far in Minnesota. Such clones, if derived from R₁ and R₂ clones having high field resistance, may still have a high degree of protection against blight even

if new races appear to which they have no hypersensitive resistance. Ultimately the field resistance of clones having no R immunitygenes may be useful in increasing the field resistance of short season clones.

Descriptions of Minnesota Advanced Selections Distributed to Growers

Seed stock of three selections were distributed to growers in 1954 and 1955. Their distribution will be continued in 1956. These selections are described as follows:

Minn. 11. A white scab-resistant clone with maturity and productivity similar to the Red Pontiac. Tubers are smooth, long, relatively broad and thick, with smooth, square ends, slightly netted. Vines are distinctly upright. It is adapted to both the Red River Valley and the Hollandale peat sections, consistently producing a high yield of desirable type and quality.

Minn. 20. A smooth, round, white clone, similar to the Cobbler in maturity, producing a heavy yield of tubers of exceptionally high market and table quality.

Minn. 355. An extra early clone, immune from the O (common) race of the late blight fungus, and relatively high field resistance to the other races found in Minnesota.

One of the uniform scab nurseries sent by the U.S.D.A. to a number of State Experiment Stations was grown at the North Central Experiment Station, Grand Rapids, Minn.. The data for this test are given in Krantz table 4.

Krantz table 4. Reaction of U.S.D.A. selections to common scab at North Central Experiment Station, Grand Rapids, Minn., 1955.

Selection	Common scab rating			
	Selection		Check ^{2/}	
	Severity ^{1/}	Coverage ^{2/}	Severity	Coverage
B 2879-4	3	H	5	H
B 2887-2	2	T	5	T
B 3004-9	5	H	5	H
B 3006-22	5	M	5	H
B 3107-17	5	M	5	M
B 3114-52	5	H	-	-
B 3140-36	5	M	5	L
B 3170-33	5	H	-	-
B 3309-2	5	M	5	L
B 3309-4	3	M	5	H
B 3309-8	5	L	5	L
B 3428-8	5	H	5	L
B 3428-29	5	M	5	H
B 3428-31	5	H	-	-
B 3428-41	2	M	5	H

Krantz table 4 continued

Selection	Common scab rating			
	Selection		Check ^{3/}	
	Severity ^{1/}	Coverage ^{2/}	Severity	Coverage
B 3429-11	3	M	5	M
B 3453-2	3	H	5	H
B 3454-14	2	L	5	M
B 3455-2	-	-	5	L
B 3456-2	1	L	5	L
B 3457-2	1	L	5	H
B 3457-4	0	-	5	L
B 3458-10	3	H	5	M
B 3458-12	0	-	2	L
B 3458-13	2	L	2	T
Ontario	1	L	5	M
Cherokee	1	M	5	L
Menominee	3	H	5	H
B 73-10	0	-	5	L
Early Gem	0	-	5	H
I 801-10	5	M	5	L
I 803-3	5	M	5	H

^{1/} Severity estimated by thickness of lesion: 1, very small and superficial; 4, thickest corky type lesion; 5, pit scab.

^{2/} Trace, less than 1% of tuber area covered; L, 1 to 20%; M, 21 to 40%; H, over 40%.

^{3/} Irish Cobbler check at one end of each 3 hill test row.

MINNESOTA

A. G. Peterson and D. M. Noetzel

Observations on Resistance of Potatoes to Insects

In cooperation with F. A. Krantz and Florian Lauer, of the Department of Horticulture, limited observations were made during the past 4 years on insect populations in the potato-breeding material grown at Castle Danger, Minn. We have been particularly interested in finding *Solanum* material with a high degree of resistance to the potato leafhopper (*Empoasca fabae* (Harris)), the green peach aphid (*Myzus persicae* (Sulz.)), and the potato aphid (*Macrosiphum solanifolii* (Ashm.)). The potato leafhopper is a serious pest of potatoes in Minnesota and causes great reductions in yields if not controlled, whereas the aphids are primarily of importance in transmission of virus diseases.

Our usual procedure is to count the insects per 25 compound leaves selected at random from the 2 to 5 plants in each plot. Interspecific *Solanum* crosses have received most attention recently, and several standard varieties have been included for comparison.

Results obtained at Castle Danger in 1954 indicated that considerable resistance to the potato leafhopper occurred among the progeny of crosses of either *S. Rybinii* or *S. phureja* with *S. chacoense* (Peterson table 1). This resistance apparently came from *S. chacoense*. Further work at St. Paul in 1955 gave further indication that some of the progeny of these crosses were resistant to the potato leafhopper (Peterson table 1).

Peterson table 1. Comparisons of potato leafhopper counts on several interspecific *Solanum* crosses grown at Castle Danger and St. Paul, Minn.

Clone	Parentage	Average leafhopper per 25 leaves			
		Castle Danger ^{1/} Aug. 23, 1954	St. Paul 1955		
			7/6 ^{1/}	7/11 ^{2/}	7/30 ^{2/}
C4.1	<i>S. phureja</i> x <i>S. Rybinii</i>	84	44	55	9
C1.1	<i>S. phureja</i> x <i>S. chacoense</i>	24	8	15	22
C1.2	" x "	2	42	32	25
C10.1	<i>S. chacoense</i> x <i>S. phureja</i>	12	8	14	8
C10.2	" x "	9			
C5.1	<i>S. Rybinii</i> x <i>S. chacoense</i>	7	23	26	8
C5.2	" x "	5	4	12	6
C9.1	<i>S. chacoense</i> x <i>S. Rybinii</i>	6	11	15	2
C9.2	" x "	7			
Waseca		65			
Chisago		67			
Pontiac			37	49	34
<i>S. Rybinii</i>		38	16	29	5

^{1/} Average of 2 blocks

^{2/} Average of 4 blocks.

At Castle Danger in 1954 it was observed that *Solanum phureja* was very attractive to the flea beetle, *Systema frontalis* (Fab.). The plants of *S. phureja* had 15 to 20 flea beetles per plant, while nearby plants of other clones had only 1 to 2 flea beetles per plant.

MINNESOTA

Orrin C. Turnquist, Extension Horticulturist

Potato Variety Demonstration Plots

As in past years, potato plots were again planted at various locations in Minnesota in cooperation with commercial growers, county agricultural agents, branch experiment stations, and the State seed department. The purpose of these plots was to familiarize the grower with new potato varieties and to assist him in evaluating the varieties for use in his area.

Where possible the plots were located in commercial fields in the principal potato-growing areas of Minnesota. One hundred pounds of seed of each variety was planted in a double row with a commercial planter. The plots were laid out in a randomized block design and replicated twice. At harvest the potatoes from a rod row within the double row of each variety were weighed and graded for size. Samples were taken from each plot to determine the specific gravity of the various varieties tested.

In 1954 the plots, as described above, were planted at the following locations: Baker, Oslo, Kennedy, Osseo, and Hollandale. The plots at Baker and Kennedy in the Red River Valley suffered from unfavorable growing conditions. The plot at Osseo was grown on sand and was irrigated twice. The Hollandale plot was grown on the peat east of Maple Island. Each plot consisted of 12 varieties except Baker, Kennedy, and Hollandale which had 13. The source of seed of a variety was the same for each plot.

The total yield, percentage over 1 7/8" and percentage dry matter are presented in Turnquist table 1. In general, the average total yield for most varieties was lower in 1955 than in previous years. The Redglo and Irish Cobbler ranked highest, but Cherokee, which has averaged high in the past, was one of the lowest in rank in 1955. The new variety Dazoc appeared to be quite promising in the Red River Valley.

In Turnquist table 2 are presented the yield and percentage of tubers over 1 7/8" for varieties tested in smaller 25-hill plots at 3 locations. The varieties La Soda and Redburt appeared to be 2 of the best varieties at these locations. A new selection, I803-3, was very promising at the Roseau plot. In addition to having resistance to late blight and virus X, it produced smooth, shallow-eyed tubers of good cooking quality. A few pustules of type 2 scab were observed on the tubers of this selection at the Roseau plot. Merrimack, Saco, Delus, and Van Isle were tested for the first time. Maturity of these varieties appeared to be later and the tubers rougher than other varieties in the test.

Turnquist table 3 presents the average dry matter for 9 potato varieties over the 4-year period 1952 to 1955. RRV indicates the 4-year average of 3 locations in the Red River Valley. Cherokee, Cobbler, and Kennebec appear to be

Turnquist table 1. Performance of potato varieties in Minnesota in 1955.

Variety	Location and yield per acre															
	Baker			Osle			Kennedy			Osseo			Hollandale			: Ave.
	:Total yield	No.1 size	Dry matter	:Total yield	No.1 size	Dry matter	:Total yield	No.1 size	Dry matter	:Total yield	No.1 size	Dry matter	:Total yield	No.1 size	Dry matter	
Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	Pct.	Pct.	Bu.	
Redglo	188	64	17.9	233	93	18.1	130	76	19.5	270	72	13.8	518	87	17.7	268
I. Cobbler	161	92	20.6	252	96	22.3	134	81	20.4	250	93	17.9	530	94	20.4	265
Dazoc	231	68	19.8	257	90	21.4	143	76	19.3	203	86	17.0	376	91	18.1	239
Redburt	174	84	17.9	175	89	19.5	120	82	17.2	304	93	16.8	392	96	17.0	233
Red Pontiac	178	88	15.8	188	94	18.1	104	84	17.4	190	88	12.8	476	93	15.6	227
Sheridan	186	73	19.8	262	89	20.0	138	78	19.1	250	84	18.3	264	83	18.9	220
Red LaSoda	92	78	18.1	218	96	19.1	135	92	18.5	300	91	16.2	348	93	16.6	219
Waseca	117	70	16.2	238	95	18.9	136	87	17.9	198	93	13.6	396	95	16.8	217
Kennebec	118	84	18.3	158	88	17.2	111	75	18.9	242	98	17.4	414	90	17.7	209
Redkote	142	59	17.0	154	81	18.9	164	82	17.9	229	68	13.8	354	75	16.8	209
Early Gem	86	78	15.8	176	96	18.3	132	87	17.0	202	94	12.6	260	93	15.4	171
Cherokee	107	83	19.5	130	87	19.8	90	71	18.5	266	86	19.3	232	89	17.9	165
Rushmore	100	91	18.1	-	-	-	81	78	18.1	--	-	-	318	97	17.0	100
Average	144		18.1	203		19.3	124		18.4	242		15.8	375		17.4	
L.S.D. 5%	40			45			45			64			127			31
Cooperators	Baker, Mimm - Eugene Peterson															

Baker, Minn. - Eugene Peterson
Oslo, Minn. - Earl Mallinger
Kennedy, Minn. - Grant Bothum
Osseo, Minn. - Eldon Tessman
Hollandale, Minn. - John Ravenhorst, Jr.

Turnquist table 2. Performance of potato varieties at three locations in Minnesota, 1955.

Variety	Little Fork		Elbow Lake		Roseau		Dry matter
	Total	No. 1	Total	No. 1	Total	No. 1	
	yield	size	yield	size	yield	size	
	per A		per A		per A		
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Pct.
LaSoda	300	85	355	93	228	91	20.2
Redburt	250	87	369	94	265	91	19.8
Red Pontiac	238	86	350	95	196	90	16.8
Irish Cobbler	200	72	284	87	206	85	22.1
Kennebec	260	80	345	89	224	87	20.6
Cherokee	183	73			199	84	21.7
Early Gem	210	82			131	89	18.9
Waseca	176	75	191	89	166	81	18.5
Redkote	144	81	478	92	224	84	19.8
Red Bliss Triumph			144	86	136	86	19.3
Merrimack	310	89					
Saco	271	90					
Delus	188	94					
Red Warba					166	83	20.6
Van Isle					212	83	20.8
Osage					137	84	21.7
Keswick					141	92	22.7
I 803-3					222	90	22.1

Turnquist table 3. Average dry matter of potatoes for 4-years in Minnesota

Variety	RRV ^{1/}	Hollandale		Osseo	Average
	Pct.	Pct.		Pct.	Pct.
Cherokee	21.1	19.2		19.0	19.8
Cobbler	21.3	18.0		17.8	19.0
Kennebec	19.9	18.5		18.0	18.8
Redkote	19.6	16.7		16.1	17.5
Redburt	19.4	16.2		16.6	17.4
La Soda	19.5	15.9		16.1	17.2
Waseca	19.0	15.7		15.2	16.6
Red Pontiac	18.6	14.9		15.1	16.2
Early Gem	18.3	15.0		15.0	16.1
Average	19.6	16.7		16.5	

^{1/} Red River Valley

consistently high in dry matter at all locations. Early Gem and Red Pontiac, on the other hand, are consistently low. In general, the Red River Valley area produced higher dry-matter potatoes than Hollandale or Osseo. If varieties like Cherokee, Cobbler or Kennebec are selected, however, dry matter may be obtained on both sand and peat land.

An observation scab plot was grown at Embarrass, Minn. Several selections sent out by the U.S.D.A. and other State experiment stations were included in 10-hill plots. The performance of these selections, together with named varieties, is reported in Turnquest table 4. The white selections I803-3 appeared to be one of the most promising. One of the best red selections appeared to be B 3309-2. Turnquist table 4. Potato variety observation plot, Embarrass, Minn., 1955.

Variety	Total yield per acre	Tubers over 1 7/8"	General rating	Scab	Blight	Color	Variety	Total yield per acre	Tubers over 1 7/8"	General rating	Scab	Blight	Color
	Bu.	%						Bu.	%				
Warba	489	90	3	x	-	W	Saco	506	98	3	-	-	W
Red Warba	526	97	4	x	x	R	Merrimack	320	96	3	x	-	W
I.Cobbler	495	95	4	x	x	W	Pungo	352	97	2	x	-	W
Chisago	472	98	2	x	-	W	Ontario	378	98	4	-	-	W
Waseca	309	91	3	x	x	R	Liberty						
Osseo	352	95	3	x	x	W	Russet	284	96	3	-	x	Rus.
E. Ohio	347	96	4	x	x	R	Menominee	316	94	3	-	-	W
Bliss							B 2879-4	326	96	2	x	x	R
Triumph	450	95	4	x	x	R	B 2887-2	304	98	4	-	x	W
Red Bliss							B 3004-9	359	100	4	-	-	W
Triumph	329	89	4	x	x	R	B 3006-22	410	92	2	x	-	W
LaSoda	360	86	3	x	x	R	B 3107-17	403	99	5	-	-	W
Red "	435	86	2	-	-	R	B 3114-52	275	95	2	x	x	W
Redburt	280	89	2	-	-	R	B 3140-36	264	95	3	x	-	W
Redkote	229	87	2	-	-	R	B 3170-33	295	98	2	x	-	W
E. Gem	272	86	4	-	-	Rus.	B 3309-2	360	96	2	-	-	R
Cherokee	382	87	3	-	-	W	B 3428-8	373	95	2	-	-	W
Kennebec	412	87	2	-	-	W	B 3428-29	321	93	3	-	-	W
Chippewa	340	94	4	x	x	W	B 3428-31	414	92	4	-	x	W
Katahdin	299	98	2	x	x	W	B 3428-41	346	94	2	-	-	W
Osage	217	95	2	-	-	W	B 3429-11	302	100	4	-	-	W
Manota	257	94	3	x	x	W	B 3453-2	286	94	3	-	-	R
Keswick	438	99	3	-	-	W	B 3454-14	159	67	4	x	x	R
Sebago	347	92	3	-	-	W	B 3455-2	367	84	2	x	-	R
Rus. "	312	97	3	x	x	Rus.	B 3457-4	335	87	3	-	-	R
Rushmore	270	96	2	x	x	Rus.	B 3458-12	300	96	3	-	-	R
R.Burbank	349	94	3	-	-	Rus.	B 3458-13	227	80	3	-	x	R
Gr. Mt.	293	96	3	x	x	W	B 2368-4	475	92	3	x	-	R
R.Pontiac	406	97	3	x	x	R	P 51-2-2	307	92	3	-	-	R
Van Isle	266	94	3	x	x	W	B 2368-11	382	91	3	-	-	R
Sequoia	376	100	3	x	x	W	B 2368-13	346	93	2	-	-	R
Satapa	223	94	2	x	x	R	B 2874-4	453	93	2	-	-	R
Dazoc	433	93	2	x	x	R	B 2922-26	290	96	2	-	x	W
Sheridan	555	93	3	x	x	R	B 3003-27	282	92	3	x	x	W

(continued)

Turnquist table 4, continued.

Variety	Total yield per acre	Tubers over 1 7/8"	General rating	Scab	Blight	Color	Variety	Total yield per acre	Tubers over 1 7/8"	General rating	Scab	Blight	Color
	Bu.	%						Bu.	%				
Redglo	526	94	3	x	-	R ND	457-1-10	369	95	4	-	x	W
Delus	356	98	3	x	-	W ND	457-1-16	346	96	4	-	x	W
B 3309-4	329	94	3	-	-	R ND	457-1-35	233	98	2	-	-	W
ND 2910-1R	296	95	2	-	x	R ND	2555-12R	303	90	2	-	-	R
B 3310-5	274	99	4	-	-	Rus. ND	2728-20R	343	94	3	-	-	R
Plymouth	406	98	3	-	-	W ND	2774-3R	216	92	5	-	x	R
I 801-10	486	95	4	-	-	W Pur B	947-17	343	84	2	-	-	R
I 803-3	430	89	2	-	-	W Pur B	1126-3	141	92	5	x	x	R
I 8140-1	426	96	3	-	x	R Pur B	2334-10	322	98	3	-	-	Rus.
ND 2906-1R	355	98	4	-	x	R P	50.3-53-9	200	90	4	-	-	Rus.
B 595-76	326	95	2	-	-	W P	50.4-53-40	343	94	3	x	x	R
Minn 1	189	96	4	-	-	W P	51.4-53-5	242	96	2	-	-	Rus.
Minn 11	452	98	2	-	-	W P	51.1-53-14	320	89	2	-	x	R
Minn 12	293	96	3	-	x	W P	51.1-53-15	272	89	3	-	-	R
Minn 20	422	97	4	x	x	W P	51.13-53-2	266	91	4	-	-	Rus.
Minn 24	356	94	2	-	x	W P	51.20-53-4	416	89	4	-	-	W
Minn 119	447	87	3	x	x	W P	51.20-53-11	323	94	3	-	x	W
Minn 355	443	99	4	-	-	W P	456.20-53-1	252	95	4	-	-	R
Minn 358	436	92	2	x	x	W							

Plot located on Arvo Saari Farm. General Rating: 1, very good; 2, good; 3, fair; 4, poor; and 5, very poor. x indicates scab or blight on tubers.

MISSISSIPPI

W. S. Anderson, J. A. Campbell, B. C. Murphy and W. W. Watson

In 1955, 5 named varieties were tested at 4 locations and a second seed source of 1 was included at 1 location. Seven unnamed seedlings, furnished by T. P. Dykstra of the U.S.D.A. and 2 named varieties were compared in another test at State College. This test of 9 lots was planted of seed tubers grown at Crossville, Tenn., in 1954.

At State College the plots were located on a soil classified as Kaufman fine sandy loam. Fertilizer consisted of 2,400 pounds per acre of 6-8-8, half of it applied broadcast a month before, and half side-placed in the row on the day of planting March 3. Irrigation was given as needed and 3 weekly applications of a copper fungicide and DDT spray were given to control diseases and insects. Plant growth was excellent after an approximate perfect stand emerged. Weather conditions were favorable for the crop, the month of June being the coolest on record here. The plots were harvested on June 27.

At Newton the plots were located on a soil classified as Stough very fine sandy loam. The fertilizer consisted of a single in-the-row application of 1,500 pounds per acre of 6-8-8 at planting time March 2. A good stand came up and the plants were killed late in March by a freeze, but they emerged again. Irrigations and pest controls were given as follows: One 2-inch irrigation on May 4, and 2 applications of DDT spray for insect control. The plots were harvested on July 19.

At Crystal Springs the plots were located on a Loess soil classified as Providence silt loam. Fertilizer consisted of 1200 pounds per acre of 6-8-8, applied in the row at planting time March 1. Irrigation was given as needed and pest controls consisted of applications of Marlate in dust form frequently enough to control insects. The plots were harvested June 13.

At Stoneville the plots were located on a sedimentary soil, classified as Bosket very fine sandy loam. The fertilizer consisted of a single in-the-row application of 60 pounds actual nitrogen from ammonium nitrate at planting time March 4. No irrigations nor pesticides were applied. The plots were harvested June 3.

At all places the plots were single rows of 25 hills spaced 12 inches apart. The rows were either 40 or 42 inches apart. There were 6 randomized blocks at Crystal Springs and Newton and 7 at State College and Stoneville.

Table 1 presents a summary of the yield data for the named varieties at 4 places. As in 1954, LaSoda led in No. 1 and total for all places combined. It was the leader in No. 1 at all places though the lead was very small for State College. The attractive color and shape of the tubers and the consistently good yield of No. 1's, warrants this variety being recommended for growing in this State instead of Triumph. In most instances the white varieties, Kennebec and Katahdin were about equal to each other but much superior to Triumph in No. 1 and total yield. Redglo was disappointing in yield, but

more so in quality. The tubers were rough, poorly shaped and showed much scab injury. The one year's test seems to show that it is not adapted to the Mississippi spring crop conditions.

Miss. table 1. Average yields (60-lb. Bu.) of Irish potato varieties at four places in Mississippi, 1955.

Variety	State College		Crystal Springs		Newton		Stoneville		All places	
	No. 1	Total	No. 1	Total	No. 1	Total	No.1	Total	No.1	Total
Bliss										
Triumph							36	72		
Triumph	76	128	176	207	112	122	39	112	100	145
LaSoda	167	206	242	261	154	164	109	191	165	205
Redglo	105	162	206	251	137	170	38	135	121	179
Kennebec	149	184	184	194	136	141	101	185	142	176
Katahdin	166	196	194	201	135	143	57	126	138	176
Place										
Means	132	175	200	223	135	148	63	137	133	174
L.S.D. 5%	29	*	35	*	N.S.	*	26	*		
" 1%	39		48				35			

* Statistical analysis was not applied to the total yields.

In order to observe their keeping quality, half-bushel size lots of No. 1's from the State College plots were placed in a sweetpotato storage room on June 27, the day of harvest. The 5 named varieties and seedling 1859 were included. On August 29 observation showed considerable rotting in Triumph, Kennebec, and 1859, but very little in LaSoda, Katahdin and Redglo. They were placed in a refrigerated storage at 40-50°F. where they remained until November 25 when final observations were made. There was no additional rotting observed in any variety.

Miss. table 2 presents the data from the seedling test at State College, including Tennessee-grown seed of LaSoda and Triumph.

Seedling or variety	Seedling test, State College, Miss., 1955		
	Bushels (60 lbs.) per acre, average of 3 plots		
	No. 1	Others	Total
LaSoda	23	45	68
Triumph	6	25	31
1859	108	34	142
3769	62	51	113
3953	49	16	65
3972	29	43	72
3674	25	43	68
4411	22	66	88
3962	15	31	46

a comparison of the yields of LaSoda and Triumph in this test with those of western-grown seed of these in the adjacent test (Miss. table 1) shows that the Tennessee seed is not suitable for adequate yield trials. Even so, this test, plus information from previous tests, indicates that seedling 1859, 3769, 3953 and 4411 should be tested further. Western-grown seed of these should be secured for such tests.

NEBRASKA

H. O. Werner, Project Leader; participating extensively, Robert O'Keefe, Lionel Harris, G. James Dinkel, and Richard Miyoshi

The general seasonal routine of the numerous phases of the breeding program has been carried through as in former years. In this report we are considering only the most distinctive aspects or results and a few of the phases on which work has been undertaken recently.

Red-tuber lines:

Continued gratifying progress has been made in developing parent lines that have relatively high homozygosity for red skin color combined with good horticultural characteristics. This has been accomplished chiefly by crossing various red tuber lines that also have several good horticultural characters, partly by sib crossing and to a minor degree by selfing. With some of these combinations all segregations have red tubers and many of them are very dark. The following have been among the crosses most satisfactory for producing red tubers:

Nebr. table 1. Incidence of tubers of different color intensity within several families.

Cross No.	Parentage	Number of segregates with tubers of each color							Desirability of cross
		Dark red	Med. red	Lt. red	Red eye	Pink	White	Total	
7.53	(140.47-1 x 140.47-1)	2	4	4	4	1	0	15	Very good
9.53	(95.48-1 x 140.47-1)	9	20	15	6			50	Excellent
102.53	(144.49-15 x 41.49-4)	26	8	2	3			39	Good
104.53	(154.49-10 x 41.49-4)	13	16	23	14			66	Good
108.53	(156.49-5 x 41.49-4)	15	20	20	8			63	Good
187.53	(68.49-1X x 156.49-5X)	10	12	8	3		2	35	Good

140.47-1 (117.43-3 (Minn. 29.32-1-34
 (49.40-1 (Minn. 5-10-3-23-2
 (Minn.36-2 (Hindenburg
 (Triumph
 95.48-1X (117.43
 (MD 136

41.49-4 (117.43-3 selfed)

			(Minn. 5-10-3-23-2 (Colo. 1485
		(27.41-1	
	(113.43-1	(	
	(	(	(Minn. 5-10-1-29-22
	(	(7.42-1	(Triumph (Neb. 23)
	(51.46-1	(	
	(	(	
68.49-1X	(	(Minn. 29.32-1-34	
	(59.40-1	(	(Minn. 41-2-12-1-1-1
	(	(13.37-6	(Minn. 74-1-1
	(		
	(59.41-P1	(Hindenburg	
	(	(Earlaine	
	(	(K5 (Colo. 1485) (Triumph	

156.49-5X	(Cayuga	(Minn. 29.32-1-34
	(	(
	(39.41-1	(M15-14-8-1
	(	(Minn. 53.35 (M30-11-3-2
	(311.43-1	(
	(	(
	(ND 171	(Minn. 75-5
		(Early Rose

Red skin color and scab resistance:

A number of red-skin tuber clones with a high degree of scab resistance have accumulated in the program. Most of the clones with greatest apparent resistance come from the crossing program of most recent years. Some of these are very dark red and less than one-third are paler than Triumph. However, skin of many of these lines is netted or flaky so as to take on a russet effect, which at the present time seems to be considered undesirable by the trade. Many of these, especially those with a flaky skin, were derived from crosses with Cayuga which also contributes very good tuber type and high dry matter content. Hindenburg also seems to account for considerable russetting. The significance of other scab-resistant lines to their russetting has not been determined. A detail classification of these red-skin clones is being made to determine which have the brightest and smoothest red skins which remain red with maturity and during long storage. Lines known to be a source of serious russetting will not be used in the 1956 crossing program with the red lines. From close observation of thousands of tubers produced under a great range of environmental conditions has evolved the thought that a thorough study of the histological nature of various types of periderm russetting should supply much factual background for a more intelligent understanding of this problem and some aspects of scab lesion classification frequently confused with russetting.

Nebr. table 2. Number of lines with red-skin tubers being continued in Nebraska program, classified according to type of scab lesions observed in a good field test in 1955.^{1/}

Year of cross	Type of scab lesions						
	1-	1	2	3	4	5	6 to 9
1941	1						
1947		1		1			
1948		1	2	3			
1949		1	2	5	6	2	1
1950			2	1	10	2	2
1951	2	1	8	3	5	1	4
1952	1	3	1	5	12	6	3
1953	2	8	19	28	49	13	10

1- Merest evidence of a lesion; 4, large surface lesion, 5 and above are pits of increasing magnitude.

^{1/} Clones with lesions of 4 or higher possess a number of very good horticultural characteristics.

Red lines:

Selected for 1956 parents because of combination of numerous good horticultural characters (usually including scab resistance) with red color.

Nebr. table 3. Selected lines and their major characteristics.

Line	Cross	Sea- son	Tuber color	Tuber type	Scab type/inc.	In- terior color	Sp. grav. (Mode)	Other charac- ters	Gen rat- ing
140.47-1	(117.43-3 selfed)	5	R8	9-	4	1	W+	1.087	8
93.48-1	(SND 133 x 117.43-3)	4	R7	9-	3	2	W+	1.088	Long, flat 8+
95.48-1	(SND 136 x 117.43-3)	4	R9	9	5	5	W+	1.080	Broad, ovate 8
41.49-4	(117.43-3 self)	5	R8	8	5	2	W-	1.082	8-
82.49-1X	(143.47-16 x 59.41-P1	5	R7	9-	4	3	W++	1.085	Yield + 9
83.49-1	(Kasota x 143.47-16)	3	R7	8+	4	3	W+	1.090	Early 8+
86.49-1X	(59.41-P1 x Minn. 43)	5	R5	8	1-	1-	W+	1.075	8

Nebr. table 3 continued

Line	Cross	Sea- son	Tuber color	Tuber type	Scab type/inc.	In- terior color	Sp. grav. (Mode)	Other charac- ters	Gen. rat- ing
114.49-1X	(25.42-2 x Mimm.48-1)	6	R7	8+	3 1	W _±	1.095	No. stolons	8
131.50-2	(117.43-3 x 368.43-3)	6	R8	8+	4 2	W _±	1.083		8
191.50-1	(140.42-1 x 386.48-5)	6	R8	9-	5 2	W _±	1.078	Ex. long red	8+
215.50-2	(M20.20-48 x 405.48-1)	5	R7	9	4 2	W _±	1.085	" " "	9
83.51-5	(228.48-1 x 91.47-1)	5	R6	8	2 1	W+	1.080	Yield	7
114.51-2	(47.47-1 x 134.47-2X)	6	R6	9-	1- 1	W _±	1.078		8+
164.51-2	(194.49-2 x 86.48-1)	4	R5	8	2 1	W _±	1.085		8-
181.51-2	(30.48-4) x 254.48-1)	5	R7	8-	4 2	W+	1.080		8-
222.51-9	(86.48-1 x 368.48-1)	8	R7	8	2 1	W+	1.075		7+
395.51-1	(USDA B766-2 x 139.47-1)	6	R8	9-	4 2	W _±	1.070	X Res.	7+
111.52-1	(28.49-2 x 320.48-1X)	8	R8	9-	3 5	W+	1.078		7
156.52-2	(302.48-1 x 120.50-2)	6	R8	9-	1 1-	W _±	1.074		8

Code: Season: 1, very early; 9, extremely late.

Red color: 1, very pale; 4, (Triumph) medium, 9, extremely dark.

Tuber type: 7, minimum commercial; 9, excellent.

Scab: Type, 1, very small, superficial; 4, large surface lesion,
5, small pits. Incidence, 1, very slight; 5, much.

Interior color: W, very poor white, W_±, intermediate; W+, very white.

General rating: 7, minimum commercial, 9, excellent.

Virus X: Freedom or resistance

With virus X serum provided by Dr. Ellen Moorhead and with the cooperation of Dr. W. A. Allington (both of the Plant Pathology Department), plants from a variable number of indexed tubers of some of the advance lines were tested and many "X-free" tubers were thereby isolated.

Lines that appeared to be free of virus X were:

From clones with no recognized resistance in parents:

Redglo (209.43-1)
 120.40-6, white
 223.48-1X russet, scab resistant
 82.49-1X bright red, high yield.
 226.49-1X russet - excellent tuber type.

From clones with B 766-2 (USDA) as one parent:

369.51-1 russet white
 392.51-3 red (scab resistant)
 395.51-1 red

The plant pathologists are endeavoring to determine whether this X freedom is very high resistance, immunity, or merely escape. Seed stocks of X-free tubers are being increased with several of the most advance lines. Numerous precautions are being used to prevent mechanical transfer of the virus while the stock is being increased.

Interior color of scab-resistant red lines:

Another difficulty encountered in using Cayuga as a parent has been the greater number of segregates with poor interior color than has usually occurred with other scab-resistant parents. On the basis of the scatter diagram (table 4) it appears that a good white interior combined with high scab resistance may be equally attainable in red- and white-skin clones.

Nebr. table 4. Number of clones; Interior color vs. severity of scab lesions, advance lines in 1954-55.

Severity of scab lesions	Interior color			
	Very white	Good white	Intermediate white	Poor white
Red skin clones				
1		5	7	1
2	1	3	6	5
3	3	3	8	
4		3	4	
White, smooth, or russet-skin clones				
1	4	4	13	
2	2	5	6	1
3		3		
4			2	

South Texas test of red clones:

In a test of 175 red clones from Nebraska at the experiment station at Weslaco, Tex., (Lower Rio Grande Valley), in January-April 1955, more

than 30 appeared superior in skin color and general commercial desirability to any red-skin varieties then available. Most, but not all of these lines, were of superior merit in the trials in Nebraska.

The better lines, i.e., those given the highest general ratings, were:

Sheridan	76.50-3	222.50-4
315.48-3X	257.50-1	215.50-2
181.51-2	13.51-3	156.52-2
95.48-1	222.51-9	131.50-2
41.49-4	107.52-1	77.44-1
		83.49-4

These selections are rated on the basis of observations of tubers observed at three weekly intervals from March 24 to April 8.

Cooperative observational and yield tests are being conducted there in January-April 1956. Local collaborators are Paul Leeper, Horticulturist, and W. R. Cowley, Superintendent.

Adaptation trials of advance lines (compared with commercial varieties being grown):

Seven advance red and four advance white or russet varieties were planted in single-row 25-hill plats, randomized in 4 tiers in each of 11 plats located in various parts of the State. The locations and general characteristics of the trial points, the data from which are presented as means for the plots in each geographic cultural area were as follows:

- a. Western irrigated, late crop - 4 plots 3650 to 4,200 ft. altitude.
- b. Western dryland, late crop - 4 plots 3,650 to 5,200 ft. altitude.
- c. Central irrigated, summer crop - 2 plots 2,500 to 3,000 ft. altitude.
- d. Eastern non-irrigated, summer crop, - 1 plot 950 ft. altitude.

The month of June was much cooler than usual but the other months were warmer than usual. The means of data from plats in the same general geographic-cultural group are presented in table 5. A brief coded tabulation of important characteristics of each line or variety is given in table 6.

Present prospects now are that line 26.44-1 will be released before April 1956. In 1957 or soon thereafter, lines 223.48-1X, 215.50-2, 226.49-1X, and 29.47-2 may be released. All of these lines are superior in one to several characteristics to existing analogous commercial varieties.

Publication:

1954 Nebraska Potato Variety Trials, R. B. O'Keefe and H. O. Werner,
Nebraska Horticultural Progress Report 26: April 1955.

Nebr. table 5. Nebraska adaptation trials in 1955.

A & B		Yield per acre and percent U.S.#1, A-size							
Variety or line	Late crop				Summer crop				
	Western Nebraska				Central Nebr.		Eastern Nebr.		
	Irrig.		Dryland		Irrig.		Not irrig.		
	3600'- 4200'		3600'- 5200'		2500'- 3000'		950'		
	(4 plats)		(3 plats)		(2 plats)		(2 plats)		
	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	Bu.	Pct.	
Established red varieties									
Triumph	311	58	76	58	-	-	-	-	
Progress	369	77	77	61	-	-	-	-	
LaSoda	363	54	101	63	425	86	376	81	
Red Pontiac	396	66	102	64	399	66	351	77	
Dazoc	381	72	72	54	381	87	314	82	
Sheridan	349	68	68	57	406	84	372	88	
Redglo	402	72	89	66	321	61	419	86	
Red Warba	223	40	51	40	359	82	261	74	
Advanced red lines									
26.44-1	344	77	87	74	363	85	391	90	
82.49-1X	543	77	123	70	428	81	464	86	
215-50-2	355	75	93	69	301	73	291	79	
93.48-1	343	73	88	70	323	76	302	79	
83.49-1	361	77	87	70	290	81	342	86	
95.48-1	315	58	103	64	360	83	383	91	
154.47-2	332	69	87	72	353	85	203	54	
Commercial white varieties									
White Cloud	223	47	70	54	306	82	318	92	
Cayuga	332	72	78	63	283	72	244	85	
Katahdin	-	--	--	-	329	87	257	95	
Marygold	-	--	--	-	237	75	123	89	
Advanced scab-resistant white lines									
25.47-7X	396	66	123	72	432	83	398	87	
29.47-2	434	76	109	69	365	82	375	88	
223.48-1X	476	84	109	68	379	89	355	91	
226.49-1X	413	80	97	68	281	82	217	92	
Very good type - late white									
118.47-1	305	59	98	65	446	82	401	83	

Nebr. table 5 continued.

C. Percent of total A-size too scabby for U.S. #1

Variety or line	Late crop		Summer crop	
	Western Nebraska		Central Nebr.	Eastern Nebr.
	Irrig.	Dryland	Irrig.	Not irrig.
	3600'- 4200' (4 plats)	3600'- 5200' (3 plats)	2500'- 3000' (2 plats)	950' (2 plats)
	Pct.	Pct.	Pct.	Pct.
Established red varieties				
Triumph	9	6	-	-
Progress	1	4	-	-
LaSoda	24	16	1	1
Red Pontiac	8	6	0	3
Dazoc	12	9	3	10
Sheridan	17	8	3	3
Redglo	12	9	1	1
Red Warba	31	21	1	0
Advanced red lines				
26.44-1	10	7	0	1
82.49-1X	9	1	1	0
215.50-2	9	3	1	2
93.48-1	10	3	1	0
83.49-1	7	3	1	0
95.48-1	30	18	1	1
154.47-2	10	3	2	19
Commercial white varieties				
White Cloud	42	27	8	4
Cayuga	1	1	0	0
Katahdin	-	-	1	0
Marygold	-	-	0	2
Advanced scab resistant white lines				
25.47-7X	5	2	0	0
29.47-2	2	1	1	0
223.48-1X	2	1	0	0
226.49-1X	3	1	0	0
Very good type - late white				
118.47-1	10	2	1	1

Nebr. table 5 continued.

D. Defects not scab (A-size) percent of total				
Variety or line	Late crop		Summer crop	
	Western	Nebraska	Central Nebr.	Eastern Nebr.
	Irrig.	Dryland	Irrig.	Not irrig.
	3600' = 4200' (4 plats)	3600' = 5200' (3 plats)	2500' = 3000' (2 plats)	950' (2 plats)
	Pct.	Pct.	Pct.	Pct.
Established red varieties				
Triumph	29	20	--	--
Progress	15	12	--	--
LaSoda	20	12	8	14
Red Pontiac	22	22	18	18
Dazoc	8	13	3	4
Sheridan	7	7	7	4
Redglo	9	6	12	3
Red Warba	25	20	9	26
Advanced red lines				
26.44-1	7	9	7	5
82.49-1X	8	14	6	2
215.50-2	7	15	19	15
93.48-1	11	16	19	15
83.49-1	10	13	10	12
95.48-1	5	7	10	4
154.47-2	22	11	8	24
Commercial white varieties				
White Cloud	6	7	2	2
Cayuga	21	19	6	5
Katahdin	--	--	4	2
Marygold	--	--	19	5
Advanced scab resistant white lines				
25.47-7X	25	12	2	8
29.47-2	19	17	6	9
223.48-1X	11	18	1	7
226.49-1X	12	10	5	3
Very good type - late white				
118.47-1	25	14	7	11

Nebr. table 5 continued.

E. Mean specific gravity.				F. Mean (estimated) pct. dry matter				
Variety or line	Late crop				Summer crop			
	Western		Nebraska		Central Nebr.		Eastern Nebr.	
	Irrig.		Dryland		Irrig.		Not irrig.	
	3600'		3600'		2500'			
	4200'		5200'		3000'		950'	
	(4 plats)		(3 plats)		(2 plats)		(2 plats)	
	Mean	Pct.	Mean	Pct.	Mean	Pct.	Mean	Pct.
Established red varieties								
Triumph	72	17.9	77	18.9	--	--	--	--
Progress	75	18.7	80	19.7	--	--	--	--
LaSoda	74	18.4	81	19.9	--	--	63	16.0
Red Pontiac	67	16.9	71	17.7	--	--	59	15.5
Dazoc	76	18.9	84	20.5	71	17.9	68	17.2
Sheridan	75	18.7	85	20.7	73	18.2	72	17.9
Redglo	76	18.9	72	17.9	--	--	64	16.2
Red Warba	73	18.2	81	19.9	74	18.4	70	17.4
Advanced red lines								
26.44-1	82	20.2	86	20.9	76	18.9	69	17.4
82.49-1X	80	19.7	91	22.0	85	20.7	79	19.5
215.50-2	82	20.1	82	20.1	78	19.2	71	17.7
93.48-1	83	20.4	85	20.7	78	19.2	71	17.7
83.49-1	77	19.0	90	21.8	75	18.7	70	17.5
95.48-1	72	17.9	80	19.7	73	18.2	70	17.5
154.47-2	77	19.0	76	18.8	76	18.9	73	18.2
Commercial white varieties								
White Cloud	77	19.0	82	20.1	76	18.9	72	17.9
Cayuga	81	19.9	86	20.9	--	--	79	19.5
Katahdin	--	--	--	--	--	--	61	15.6
Marygold	--	--	--	--	--	--	76	18.9
Advanced scab resistant white lines								
25.47-7X	72	17.9	81	19.9	70	17.5	60	15.4
29.47-2	73	18.2	77	19.0	67	16.9	65	16.5
223.48-1X	76	18.9	86	20.9	75	18.7	71	17.8
226.49.1X	79	19.4	86	20.9	74	18.4	73	18.2
Very good type - late white								
118.47-1	77	19.2	77	19.2	64	16.2	62	15.8

Nebr. table 6. Important characteristics and various relative ratings of lines and varieties in Nebraska adaptation trials in 1955.

Variety or line	Color	Type	Shape	Inter- ior	Scab class	D.M.	Chips	So. test rate	Special assets (A) or Defects (D)
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Established red varieties

Triumph	R3	7	Ob,O	W+	4	6	6	7	D. - Gc, Hc
Progress	R7	8	O, F	W+	2	7-	6	5	D - Gc; A - ScR
LaSoda	R3	8-	Ob,T	W±	4	6	6	7	A - Y; D - Fe+
R. Pontiac	R6	7	Ob,T	W±	4	5	5	7	A - Y,S; D - low DM
Dazoc	R8	7	Bob,O	W+	4	7	7	7	A - Early red, D-dae
Sheridan	R7	8+	Ob,E	W+	4	7	7	8	A - S type, bright
Redglo	R8	7	Ob	W+	5	6	5	7-	A - Bright red, D-dae
Red Warba	R7	6	Ob,T	W±	5	6	7	7-	A - E red; D- rough

Advanced red lines

26.44-1	R5	9-	Ob,F	W+	3	8+	8	5	A - T, DM
82.49-1X	R8	8	Ob,O,F	W++	4	8	6	5	A - T,Br R,Y.
215.50-2	R5	9	L,E	W+	4	8+	6	7	A - T,Sh,Br. R
93.48-1	R4	8+	LOb,Fl	W±	4	8+	6	8	A - T,DM
83.49-1	R5	8+	Ob,-F	W±	3	7	6	7	A - E red
95.48-1	R9	9-	BO	W±	5	7	8+	9	A - + dark R; D - Sc.
154.47-2	R8	8+	BOb	W±	2	8-	7	7	A - R,T,ScR; Low Y

Commercial white varieties

White Cloud	W	8	BOb	W+	5	7	7		A - E white, T;D - Sc
Cayuga	Rus.	7	Ob,O	W-	1	8	8		A - ScR+,DM.D-Int.col.
Katahdin	W	8	Ob,F	W+	4	7	7		A - Yield; D - late
Marygold	YW	8	Ob,F	Y		7	7		A - Yellow flesh

Advanced scab resistant white lines

25.47-7X	W	8	Ob,O	W+	1	7	8		A - ScR+,Int.D - Gc+
29.47-2	W	8	Ob	W+	2	7	8		A - ScR, Int.
223.48-1X	Rus.	8+	BOb,E	W±	1	7+	7-		A-+ ScR,T,+ yield
226.49-1X	Rus	9	O,F	W+	2	8-	7		A - T+,ScR, D low yield

Very good type - late white

118.47-1	W	9-	Ob,E	W+	4	6	?		A - T+, Y+, D - late
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Color: R1, pale red, R9, very dark red. Type: 7, minimum acceptable commercially; 9, very good. Shape: B, broad; E, elliptical; F, flat; L, long; O, ovate; Ob, oblong. Interior: W, poor white; W±, minimum acceptable; +, good; ++, very good white. Scab class: 1, highly resistant; 4, not most susceptible; 5, highly susceptible. DM: 6 too low; 7, minimum commercial acceptable (1.075) 8. 1.080-1-1.090. Chips: 7, minimum acceptable; 9, excellent color. Southern test: 7, acceptable, 9, excell. Assets or defects: Br R, bright red; dae, deep apical eyes; Fe, *Fusarium eumartii*. Gc, growth cracks; Hc, harvest cracks; Sh, shape; ScR, scab resistance; T, tuber type; Y, yield.

Water relations studies:

Having no personnel available to continue the study of leaf relative turgidity, no work was done in that field this year. However, Nebraska Agricultural Experiment Station Research Bulletin 176, "Influence of Atmospheric and Soil Moisture Conditions on Diurnal Variations in Relative Turgidity of Potato Leaves," based on work done earlier, was published under date of December 1954.

Satisfactory progress was made with a method study to determine differences in extent and intensity of root growth of plants of different potato varieties as a basis for evaluating their intrinsic differences in drought endurance ability. By growing plants in long tubes of small diameter and not continuing to apply water at increasing distances from the plants (as the season advanced) potato roots of some varieties were found to extend into the 7th foot.

Distribution of seeds and seed potatoes:

True seed from the 1955 crossing program was sent to:

56 crosses: Martin W. Carstens, N. W. Experiment Station, Mount Vernon, Wash.

16 crosses: Dr. August Kehr, Iowa State Agr. Expt. Station, Ames, Iowa.

15 crosses: (all having red tuber parents) to Professor Piovanco, Argentina, via Howard L. Hyland, Section of Plant Introduction, U. S. Dept. of Agriculture.

Tubers of: 29 clones (mostly red) were sent to John Menzies, University of Manitoba, Winnipeg, Canada.

9 clones suitable for use as parent stocks to J. E. Schultz, Dept. of Horticulture, North Dakota Agricultural College.

NEW HAMPSHIRE
Paul T. Blood

Twenty-four named and numbered potato varieties were grown at Northwood, N. H. on Taxton soil. The 1955 test was planted May 17 in rows 3 feet apart allowing 10-inch spacing between plants. Each variety was planted in 2-row plots 20 feet long and replicated 4 times. Approximately 1,550 pounds of an 8-12-12 fertilizer was applied per acre, having both a low and regular chlorine content. The field was wet at planting and harvesting times. In mid-summer some of the varieties suffered from drought. The mean temperature was 6° F. above normal for the season.

The data for the yields, percentage total solids, and chipping quality are given in N. H. table 1. Green Mountain, Teton, Kennebec, Ontario, and Canoga were outstanding in yielding ability. In every comparison on a varietal bases the low chlorine fertilizer gave an increase over the regular in percentage total solids. There was a marked difference in varieties. Seedling B 621-16 showed an increase of 2.8 percent solids in favor of low chlorine fertilizer while F 451 had only 0.2 percent.

The samples for the chipping test were stored at 40°F. For 2 weeks before frying they were conditioned at 70°-80°F. The frying temperature started at 375°F. and cotton seed oil was used for a frying oil. Variety differences were observed. Nine varieties made excellent chips, 6 were good, and 9 were poor.

N.H. table 1. Yield, total solids, and chipping quality of 24 varieties of potatoes grown at Northwood, N. H. 1955.

Variety	Yield per acre		Effect of low and regular chlorine content on solids			Chip color rating
	Over 2"	Under 2"	Increase over low			
	Low	Regular				
	Bu. <u>1/</u>	Bu.	Pct.	Pct.	Pct.	<u>2/</u>
Green Mountain	708	82	22.7	21.6	1.1	P
Teton	708	48	19.0	17.8	1.2	P
Kennebec	679	36	19.5	18.4	1.1	L
Ontario	674	129	19.5	18.2	1.3	P
Canoga	665	83	19.9	18.9	1.0	P
46125	609	112	21.1	20.1	1.0	VL
Merrimack	606	66	21.5	20.5	1.0	G
Yampa**	603	45	21.0	19.2	1.8	G
Chippewa	592	72	17.5	16.7	.8	G
Houma	592	76	20.0	19.2	.8	P
Keswick	585	37	20.6	20.1	.5	P
F 451	577	95	21.1	20.9	.2	L
Russet*	569	130	21.0	19.9	1.1	L
B 355-35	556	75	19.4	17.4	2.0	G
Canso	555	42	21.5	20.4	1.1	P

N. H. table 1 continued.

Variety	Yield per acre		Effect of low and regular chlorine content on solids			Chip color rating
	Over 2"	Under 2"	Low	Regular	Increase over low	
F 4519***	544	58	22.9	22.5	0.4	L
B 926-9	536	42	16.9	16.0	.9	L
Katahdin	530	41	18.4	17.9	.5	G
B 932-9	527	40	23.7	22.5	1.2	VL
B 962-3	523	184	20.7	20.4	.3	P
Irish Cobbler	476	76	18.7	18.1	.6	G
Plymouth	445	42	18.7	17.3	.8	L
Cherokee	444	102	19.5	18.2	1.3	P
B 621-16	432	49	20.1	17.3	2.8	L

1/
L.S.D. .05 = 87 Bu.
" .01 = 116 "

2/
Color rating:
VL = Very light or excellent
L = Light or excellent
G = Good or acceptable
P = Poor or not acceptable

* Second growth
** Growth cracks
*** Hollow heart.

NEW JERSEY
John C. Campbell

Four potato variety trials were conducted by the New Jersey Agricultural Experiment Station in 1955.

Test at Cranberry, N. J., Simonson Brothers Farm

This test was planted April 10 and harvested October 27. The seed pieces were spaced 9 inches and 4 replicates were used. The season was hot and dry but the plot was irrigated 5 times. At planting time 1,500 pounds of a 7-14-14 fertilizer was applied per acre plus a side dressing of 100 pounds of ammonium nitrate and 75 pounds of Sul-Po-Mag.

The data are presented in N. J. table 1. ~~Las~~Soda, Katahdin, Chippewa, and Redburt were outstanding in yield of U.S. No. 1 grade potatoes. Irish Cobbler, Chippewa, Canso, and Russet Burbank were high in total solids, although the Russet Burbank had 43% knobby tubers.

N. J. table 1. Yield and total solids of potato varieties at Cranberry, N. J., 1955. Simonson Brothers Farm.

Variety	Source	Yield per acre				Total solids	Knobby	Jelly rot
		Over 1 7/8" diam.			B size			
		Total	U.S.#1	free off shape				
		Bu.	Bu.	Pct.	Pct.	Pct.	Pct.	Pct.
Cherokee	Maine	501	385	77	8	14.0	1	0
Russet Burbank	"	558	223	40	10	15.0	43	2
Gr. Mountain	Vermont	653	379	58	12	14.1	20	2
Pungo	Maine	550	344	63	10	13.1	26	2
Katahdin(3rd) ^{1/}	N. J.	442	393	89	9	13.6	0	5
Katahdin	Maine	571	480	84	9	13.2	6	0
Katahdin B's	N. Y.	443	400	90	7	13.3	0	2
Katahdin (2)	N. J.	475	418	88	8	13.5	0	0
LaSoda	Wis.	774	596	77	7	12.4	8	3 (scab)
Chippewa (3)	Maine	584	504	88	8	15.4	0	3
Osage	N. Dak.	329	273	83	3	15.1	0	10 (l.bl.)
White Cloud	Nebr.	340	306	90	5	17.3	0	1 (scab)
Irish Cobbler	Maine	529	449	85	11	16.1	1	0
Chippewa (4)	Maine	586	486	83	12	13.5	0	1
Canso	Maine	471	414	87	9	15.6	0	0
Redburt	Minn.	678	549	81	7.	13.8	7	2

^{1/} From certified second-crop seed. ^{2/} Table stock from 1954 crop.

^{3/} From H. Smith ^{4/} From E. Parkhurst.

Test at Cranberry, N. J., Spencer Perrine Farm

The test was planted April 6 and harvested September 13. Seed pieces were spaced 10 inches, with 3 replications of two 50-foot rows per plot. No irrigation was used, although the season was very hot and dry. About 2,300 pounds of a 5-10-10 fertilizer per acre was applied at planting time.

The results are given in N. J. table 2. The Irish Cobbler graded the most U.S. No. 1 potatoes and also had the highest percentage of total solids except for the Russet Burbank. Redburt and Pungo also gave comparable yields. The incidence of knobbiness and jelly rot were much less in the unirrigated test.

N. J. table 2. Yield and total solids of potato varieties at Cranberry, N.J. 1955. Spencer Perrine Farm.

Variety	Source	Yield per acre				Total solids	Knobby	Jelly rot	Fusarium dry rot
		Total	US #1 free off shape	B size					
		Bu.	Bu.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Canso	Maine	236	170	72	22	14.0	1	0	0
Katahdin	N. J.	207	153	74	19	15.0	0	0	1
"	Maine	237	185	78	17	14.6	0	0	Trace
"	N. J.	235	167	71	21	13.9	0	0	"
" B's	"	254	180	71	20	13.7	2	0	0
"	Maine	224	172	77	12	15.0	0	0	1
Chippewa	"	222	162	73	15	16.6	0	0	5
I. Cobbler	"	255	207	81	15	18.3	Trace	0	0
Cherokee	"	203	158	78	18	16.3	0	0	1
Redburt	"	250	197	79	16	16.2	0	0	1
Gr. Mountain	Vermont	216	157	72	20	15.5	2	0	0
Pungo	Maine	238	190	80	15	17.2	0	1	0
Rukat	N. Y.	173	132	76	17	16.8	0	0	1
Rus. Burbank	Maine	164	115	70	23	18.0	1	0	0

- 1/ Table stock from Simonson Bros, 1954 crop. 2/ E. Parkhurst, Maine.
3/ Simonson Bros, 2nd crop certified seed. 4/ F. Chandler, Maine.

Test at Freehold, N. J., Ketchum Brothers Farm

This test was planted on May 4 and harvested August 29. Each plot equalled 1/240 acre and was replicated 4 times. About 2,300 pounds of 5-10-10 fertilizer per acre was applied at planting time.

The data is given in N. J. table 3. The differences in yield between varieties are small for total yield in bushels per acre. On the basis of the U.S. No. 1 grade, the Chippewa is highest in yield, followed by Canso, Irish Cobbler, and Katahdin. The Russet Burbank tubers were 49% knobby and the Pungo tubers had 23% growth cracks.

N. J. table 3. Yield and total solids of potato varieties at Freehold, N. J. 1955. Ketchum Brothers Farm.

Variety	Yield per acre					Total solids	Knobby	Off-grade
	Source	<u>1/</u>	U.S. #1 free off shape	B				
		Total		size				
		Bu.	Bu.	Pct.	Pct.	Pct.	Pct.	
Russet Burbank	Maine	449	182	41	8	13.7	49	20
Pungo	"	464	276	59	12	15.9	0	23
Chippewa	"	569	507	89	7	16.0	0	3
Canso	"	477	441	93	6	13.7	0	0
Katahdin	"	435	389	90	7	14.1	0	3
Irish Cobbler	"	482	420	87	9	14.6	0	2
Cherokee	"	466	340	74	10	14.0	0	11
Katahdin	N.Y.	484	442	91	8	15.0	0	0

1/ Average of 4 plots of 1/240 acre.

Test at New Brunswick, N. J., Vegetable Research Farm

This experiment was planted May 2 and harvested October 1. The seed pieces were spaced at 10-inch intervals. One-half the test was irrigated 5 times and the other half was not irrigated. About 2,200 pounds of a 5-10-10 fertilizer was applied per acre.

The results of this test are found in N. J. table 4. In every instance the total yields for irrigation were greater than those for the unirrigated. The increase due to irrigation varied widely. Some seedlings and varieties responded more than others to irrigation. Boone, Merrimack, and B 2368-4 had increased yields of 56, 28, and 26 bushels, respectively, when they were irrigated 5 times. Some varieties showed a 50% increase or more in yield in favor of irrigation. The response of the varieties in regard to irrigation versus no irrigation was variable. Progress showed no difference. In 13 comparisons the irrigated lots were higher in percentages of total solids than the unirrigated areas and in the other 5 comparisons the unirrigated comparisons were highest.

N. J. table 4. Yield and total solids of irrigated and unirrigated potato varieties at the Vegetable Research Farm, New Brunswick, N. J., 1955.

Variety	Total yield		U.S. No. 1 yield				Total solids		Total knobby, jelly rot, off-grade	
	1/ I		I.		N.I.		I.		I.	
	Bu.	N.I.	Bu.	N.I.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
X96-56 ^{2/}	322	212	299	177	93	84	16.2	17.9	6	1
Boone	257	201	224	119	87	59	12.2	10.3	3	4
B 926-9	303	284	245	175	81	62	11.0	10.6	1	2
B 2368-4	332	306	271	173	83	57	14.3	11.7	3	7
B 2368-11	376	297	244	178	65	60	10.7	10.1	19	5
Plymouth	318	235	305	204	96	87	15.7	14.8	0	3
Delus	337	275	315	242	94	88	16.5	16.0	3	1
Early Gem	277	161	159	87	58	54	13.1	14.6	28	10
Cherokee	285	195	222	131	78	67	14.3	14.6	3	4
Pungo	387	344	263	220	68	64	14.8	11.7	18	15
Saco	460	303	313	191	68	63	13.6	10.6	16	4
B 355-35	322	263	248	184	77	70	13.9	12.4	7	3
Merrimack	264	236	169	142	64	60	15.7	13.4	15	10
Manota	388	278	361	222	93	80	16.0	16.7	1	0
Sheridan	388	278	260	142	67	51	14.1	12.4	2	8
Dazoc	457	274	393	189	86	69	14.6	15.7	3	5
Progress	341	163	235	96	69	59	15.3	15.3	2	1
Redglo	276	184	127	59	46	32	12.2	11.0	2	0
Netted Gem	297	176	95	56	32	32	14.8	12.9	35	18

^{1/} I, irrigated; N.I., not irrigated

^{2/} All varieties and seedlings supplied by U.S.D.A. except Sheridan, Dazoc, Progress, and Redglo supplied by Nebraska.

NEW YORK

M. W. Meadows and R. L. Sawyer

The hot, dry 1955 growing season on Long Island and in up-State New York has emphasized the need for varieties that are resistant to such growth abnormalities as second growth, growth cracks and field sprouting. Although 1955 was a record breaker in respects to lack of water and high temperatures it is not uncommon for some sections of the State to experience several weeks of such conditions during the growing season. With some, particularly Long Island, irrigation solves the water problem but so far the best answer to high temperatures is variety.

We are also interested in storage quality, culinary and chipping qualities disease resistance, and marketable yield.

Potato variety trials were planted at 8 locations in cooperation with county agents and growers of the respective counties. One trial was abandoned due to a very poor stand of plants caused by seed piece decay.

Seed of all varieties and seedlings were obtained from the USDA Station at Presque Isle, Maine.

The up-State trials consisted of a single row plot $3\frac{1}{4}$ inches wide and 30 feet long in randomized blocks replicated 4 times. Seed was spaced 10 inches in the row. Only 3 replications of the Tompkins County trials were harvested because of wet soil.

The Suffolk County (Long Island) trial differed to the extent that individual plots were 50 feet long.

Specific gravity determinations were made on 3 replications and converted to dry-matter content.

Yields and dry-matter content are given in New York tables 1 and 2, respectively.

Of the old standard varieties Katahdin still stands out in performance under adverse growing conditions. In general, Green Mountain, Kennebec, and Cobbler produced tubers of poor market quality. Of the newly named varieties Merrimack and Plymouth were outstanding. Merrimack was not particularly high in yield but it seems to hold some promise in respect to tuber appearance, disease resistance, and high dry matter content.

Plymouth matured very soon after Cobbler and was about equal to it in yield but slightly lower in dry-matter content. The variety excels Cobbler in tuber shape and appearance and is particularly desirable for scab and late blight resistance. At most locations Plymouth produced a very attractively netted skin but at several locations the netting appeared as shallow cracks.

N.Y. table 1. New York potato variety trials, 1955.

County grown, yield per acre, U.S. No. 1 and dry matter																
Variety & maturity	1,2/ : Wayne		1/ : Madison		2/ : Tompkins		: Cortland		: Essex		: Steuben		2/ : Suffolk		: Variety average	
	Bu.	Dry mat.	Bu.	Dry mat.	Bu.	Dry mat.	Bu.	Dry mat.	Bu.	Dry mat.	Bu.	Dry mat.	Bu.	Dry mat.	Bu.	Dry mat.
Early																
Plymouth	593	16.9	485	18.4	627	17.3	402	18.6	181	17.8	334	19.7	565	17.1	455	18.0
Irish Cobbler	611	17.3	515	19.7	565	17.1	384	19.1	139	17.8	328	19.9	610	17.9	450	18.4
Late																
Gr. Mountain	1116	23.5	691	21.6	590	20.2	705	16.5	344	19.1	531	19.7	649	18.6	661	20.2
Saco	991	19.5	646	18.6	667	17.9	456	17.3	279	19.3	490	19.5	781	16.1	616	18.3
Kennebec	919	18.1	670	17.9	750	16.9	448	16.6	249	18.2	533	19.1	--	-	595	17.8
B 355-35	824	17.9	509	17.5	651	16.6	607	16.6	314	18.1	480	19.7	619	16.1	572	17.5
Katahdin	1009	18.4	525	18.2	726	16.6	462	17.7	243	17.9	410	19.5	591	16.1	567	17.8
Boone	793	16.5	565	16.9	699	17.4	535	16.5	330	17.4	547	16.5	438	15.8	559	16.7
B 69-16	802	20.4	555	19.7	675	18.2	549	18.4	263	17.9	468	19.1	586	16.9	557	18.7
Merrimack	627	19.9	603	21.0	456	18.6	382	18.2	217	19.3	446	19.9	512	17.5	463	19.2
B 595-76	658	19.1	354	19.3	482	17.9	547	18.4	239	17.9	452	19.7	447	17.9	454	18.6
Delus	531	19.5	434	20.8	640	21.2	334	19.9	207	19.7	318	21.4	386	18.2	407	20.1
L.S.D. 19:1	186		111		124		79		62		146		96			
99:1	254		150		169		106		84		173		154			

1/ Muck soils

2/ Graded to U.S. No. 1 specifications

Saco, despite its high yields and above average dry-matter content, performed very poorly in respect to tuber shape. The variety is very susceptible to second growth. Delus produced a very nicely shaped tuber of high dry-matter content but yields were very low. It seems very improbable that a grower would sacrifice so much yield for quality. Boone was not outstanding in either yield or dry-matter content and was definitely inferior in market quality due to poor tuber shape. The variety matured very late and skinned badly during the harvest operation. Of the seedlings tested B 595-76 and B 355-35 would rate only fair for tuber shape and appearance. B 69-16 was susceptible to second growth and growth cracks.

New York

L. C. Peterson, A. P. Pieringer, and A. S. Alfieri

Within the limits of our experimental plots, in south central New York, we experienced the severest drought recorded ⁱⁿ over 60 years. This, coupled with very high temperature, had a drastic effect on plant growth. To a lesser extent, the same was true for the plots located on the eastern end of Long Island. The drought ended with rains beginning about the middle of August. From that time continuing until the plants were killed, growth was very rapid. It was almost impossible to obtain maturity records.

We experienced three distinct periods of blossoming and many plants were in full bloom on the day they were killed. In conjunction with this situation, we had three periods in which tuber-set occurred. A large, but misshapened crop, was the result. Knobs, growth cracks, sprouts, and internal drought necrosis in the tubers were general in all varieties tested. Iodine tests showed that starch depletion, especially in the first tubers formed, was a general condition which made specific gravity determinations of little practical value. Jelly-end rot was common and could be found in any of the varieties tested.

The above conditions, while true of all varieties tested, occurred to a lesser extent in the variety Katahdin. By comparison, Katahdin was the outstanding variety included in our plots.

Blight. The blight program has, in the past, been chiefly concerned with the attempt to combine in one variety as many as possible of the known major genes for resistance derived from Solanum demissum, and, to determine the possible additive effect of increasing the "dosages" of these genes. To this program has been added recently the attempt to include some of the minor genes. Late blight has been absent from our breeding plots in the last few years. This has limited our observations to greenhouse inoculation trials. Several hundred blight-resistant seedlings were grown in the increase plots. Some of these were included in replicated yield trials.

Leafroll. Varieties or seedlings possessing some resistance to the leafroll virus have been used as parental material. Seedlings were grown in rows alternating with plants infected with leafroll. Viruliferous aphids were introduced into the plot and the aphid population maintained at a high level throughout the season. Results of tuber-index trials with these seedlings show that a very small number survived the exposure and only a few of these survived the second exposure, without contracting the disease. Most of those which survived two years of exposure became infected when inoculated by means of caged, viruliferous aphids and all were infected when inoculated by means of grafts.

Black-Spot. Black-spot is a condition apparently induced by bruising. It consists of a blackening of the bruised tissue under the skin of the tuber

which is objectionable when the tuber is peeled. Black-spot appears to be caused by some physiological condition which is aggravated by environmental conditions. A large number of varieties and seedlings have been tested and most of these were found to be susceptible. A few consistently have been free or nearly free of symptoms and have been used as parental materials. Many seedlings have been produced, tested, and discarded. A few, resistant to black-spot, and late blight as well, have performed well under Long Island and Up-State conditions. These currently are being grown in yield trials.

Golden Nematode. Of the solanaceous plants tested for resistance to the Golden Nematode by W. F. Mai only S. vernei and S. sucrense are resistant enough to use in a breeding program. Recently, four collections of S. andigenum have been reported in Europe as resistant. Seed of these was obtained for our use by Dr. R. W. Hougas, of the Potato Introduction Station. Resistant materials also were obtained from Dr. Toxopeus, in Holland; Dr. Howard, in England and Dr. Black in Scotland. Samples of these materials were grown in soil heavily infested with the nematode. Resistant individuals were selected for breeding purposes and 50 families were produced. Approximately 6,000 seedlings were tested of which 58% were classed as resistant. The following is an example of some of the results obtained:

Andigenum selfed: 11 families; 359 individuals tested; 252 resistant; 70% free of the nematode.

Family	#Tested	#Resistant	%Free
KXA (1376-2)	30	23	77
KYI (1380-5)	39	16	55

Andigenum x tuberosum: 44 families; 3,137 tested; 1,691 resistant; 54% free of the nematode.

KXE (1376-2 x HXR-1)	180	86	48
KWG (R.Rural x 1376-6)	262	127	48

Sucrense: It was found that S. sucrense varied in its reaction to the nematode. By inbreeding, several lines were produced which maintained their resistance to the nematode over a period of years. Continual inbreeding was accompanied with self-sterility but seeds were obtained if crosses were made between resistant lines.

Resistant sucrense x resistant sucrense: 5 families; 124 individuals tested; 110 resistant; 89% free of the nematode.

Family	#Tested	#Resistant	%Free
KTM (S ₈ x S ₁₆)	36	33	92
KVJ (S ₆₂ x S ₁₆)	21	17	81

Sucrense x tuberosum; 9 families; 682 individuals tested; 395 resistant; 58% free of the nematode.

Family	#Tested	#Resistant	%Free
KSI (JPP-7 x HXR-1)	99	52	53
KMK (DDD-14 x JPY-34)	82	32	39

Resistant individuals were selected for further breeding and 200 families were produced this fall.

Vernei: This is a 24-chromosome species. Within the limits of our experience, it is not self-fertile. It has been found that seeds may be obtained by crossing different vines. Seeds, thus obtained, have been treated with colchicine and polyploids have been produced. This material has not been used as yet as breeding material.

The following table was sent to us by R. V. Akeley, U.S. Department of Agriculture. It represents the results obtained with materials sent for testing.

Peterson table 1. Golden nematode resistance trials conducted at Cornell University in 1955.

Pedigree No.	Parentage	Selections tested	Selections infected	Free	Free
		No.	No.	No.	Pct.
B 4002	Craig's Defiance x 220 (190)	34	5	29	85
B 4003	2201 (190) U.S.	3	0	3	100
B 4004	Alpha x 1685-1	64	38	26	41
B 4005	1673-24 x Profijt	190	45	145	76
B 4006	1673-24 x 1673-5	8	1	1	88
	Katahdin checks	9	9	0	0
	Total	299	89	210	

True seed from lines B 4002 and B 4003, in Peterson table 1, was obtained from Dr. Black of Scotland, ^{by Akeley} and true seed of lines B 4004, B 4005, and B 4006 was obtained ^{by him} from Dr. van Kretchmar, of the Netherlands Legation. The numbered parents in the progenies are all Solanum andigenum species that are reported to be resistant to the golden nematode.

The seed was grown in the greenhouse in 1954 at Presque Isle, Maine and transplanted to the field the same season. In 1955 samples of each clone were sent to Cornell University to be tested for resistance to Heterodera rostochiensis Wall. Five-hill rows of each selection tested were carried along in the field in Maine for source of disease-free stocks. Fertility and maturity notes were taken on the increase plots in Maine. The readings in table 1 show segregation for resistance with a high of 85% escaping infestation in B 4002 and 76 in B 4005. Fertile resistant parents were selected from these lines for future crosses.

NORTH CAROLINA
F. L. Haynes

This project is proceeding with the objectives of breeding for early maturing varieties with good market quality and resistance to late blight, scab, and southern bacterial wilt.

The project is also concerned with testing existing and new varieties for possible adaptation to eastern North Carolina. Sheridan and Dazoc are the most promising red varieties tested to date. N. C. table 1 presents the results of two of these tests.

N.C. table 1. Yield tests at Aurora and Camden, N. C., 1955. Plots 1/125 acre, 4 replications in randomized block design. Planted February 22, harvested June 15. Yields are U.S. No. 1.

Variety	Yield per acre		Dry matter		Maturity
	Aurora	Camden	Aurora	Camden	
	Bu.	Bu.	Pct.	Pct.	
LaSoda	603	508	16.0	17.7	Midseason
Essex	581	509	16.2	16.5	Late
NC 2416-43	559	543	18.4	16.7	Midseason
NC 2170-1	534	533	17.6	16.9	"
Sheridan	496	357	17.3	17.7	Early
Dazoc	488	394	16.9	17.2	"
Irish Cobbler	481	387	18.1	18.6	"
White Rose	443	491	16.7	16.2	Late
Canso	400	402	19.0	18.4	Med. early
Sebago	390	475	16.9	15.0	Med. late
White Cloud	381	355	18.6	19.1	Early
L.S.D. .05	65	16			
.01	87	22			
C.V. (yield)	9.21%	6.75%			

For several years some effort in this project has been directed toward resistance to brown rot, known locally as southern bacterial wilt, caused by *Pseudomonas solanacearum*. To date, a practical level of resistance has not been found in *S. tuberosum* or any closely related species. Resistance of a high degree has been found in *S. pinnatisectum* var. *heptazygum*. Attempts have been made to cross this species with *S. tuberosum*, but all efforts to now have failed. Crosses to *S. tuberosum* have been attempted using *S. pinnatisectum* at both the diploid and tetraploid level. In a few instances, parthenocarpic fruits were set but no evidence of ovule development was apparent.

At this location, successful crosses of any combination are difficult to obtain. A new system of humidity control has been installed in the breeding greenhouse to attempt a partial remedy. The system appears to be quite effective in maintaining humidity and is relatively inexpensive to install. The system consists of a series of oil burner nozzles mounted overhead and supplied by a one-quarter-inch pipe with water at standard city pressure. The size nozzles used were of 1-gallon-per-hour capacity and 1 nozzle was used for approximately each 200 cubic feet of space in the house. A strainer trap was installed in the main supply line to avoid excessive clogging of the nozzles. Whether this system is helpful in obtaining successful crosses remains to be seen.

The two new varieties, Boone and Plymouth, continue to perform well in North Carolina. Boone far exceeded expectations in increase plots in 1955. A large supply of foundation seed is available for distribution. The supply of seed of Plymouth is limited and is being increased for distribution in 1957.

NORTH DAKOTA (Mandan)
W. P. Baird

Thirty-two varieties of potato were tested at the Northern Great Plains Field Station, Mandan, N. Dak., in 1955, each variety being replicated five times in randomized blocks. Potatoes were planted on May 6 and dug October 26-28. The first killing frost occurred September 11, 1955. Potatoes were spaced in rows $3\frac{1}{2}$ feet apart and hills were 18 inches apart in the row. Plots were $37\frac{1}{2}$ feet long with 25 hills to the plot. Yields were somewhat below average, and hopperburn caused considerable damage to the leaves of most varieties. Scab generally was bad. The results of the test are shown in North Dakota table 1, in which varieties are arranged in order from the highest yielding to the lowest yielding.

N. Dak. table 1. Potato variety trials at the Northern Great Plains Field Station, Mandan, N. Dak., 1955.

Variety	Average yield	No. 1 compared with total	Total solids
	U.S. No. 1 per acre		
	Bu.	Pct.	Pct.
Red Pontiac	196	81	17.2
Kennebec	184	80	20.5
Pontiac	177	81	17.0
N. D. 457-1	162	78	19.4
Irish Cobbler	160	76	20.3
Redkote	158	79	19.2
Teton	155	84	18.0
Chippewa	153	74	18.7
Sequoia	150	79	16.8
Erie	148	76	21.0
White Rose	146	77	20.3
46952	144	74	18.3
Earlaine 2	142	78	19.5
Katahdin	140	74	16.8
Norkota	139	76	19.5
Mesaba	133	68	20.0
Sebago	126	84	17.1
Early Gem	125	84	18.1
Earlaine	124	70	18.0
Waseca	116	75	15.7
Houma	115	63	20.9
Triumph	112	70	15.7
Pawnee	111	69	17.0
Russet Rural	103	69	20.1
Rural New Yorker	93	69	19.5
Cherokee	93	53	17.9

(continued)

N. Dak. table 1 - continued

Variety	Average yield U.S. No. 1 per acre	No. 1 compared with total	Total solids
	Bu.	Pct.	Pct.
Warba	92	68	19.0
Mohawk	92	83	18.5
Osage	86	81	20.2
Red Warba	79	61	18.0
Progress	58	40	16.3
Kasota	49	50	15.8
L.S.D. 5% level	30		
" 1% "	39		

NORTH DAKOTA (Fargo)

Robert Johansen, J. H. Schultz¹, and Nick Sandar

The problem, objectives, and plan of work in potato breeding for North Dakota remain essentially the same as reported in the 1951 report.

Potato Crossing Program

Three hundred thirty-seven controlled crosses and 13 self pollinations were made in the greenhouse during 1955. Most of the varieties and selections used as parents had a high degree of resistance to one or more diseases, particularly scab, late blight, virus X, and virus Y. The principal horticultural characters sought in crosses were quality, tuber type, high yield, early maturity, both red and white skin color, and russeting skin type. Parental material from the USDA and from the Idaho, Minnesota, Iowa and Nebraska Experiment Stations was used extensively in making many of the crosses.

Greenhouse and Field Seedlings

Approximately 30,000 seedlings from controlled crosses were grown in the greenhouse. Late blight and virus X inoculations of seedling families were again made in 1955. This work is done in cooperation with Dr. Wm. G. Hoyman, Department of Plant Pathology, and consisted of inoculating 50 families bred for late blight resistance, 16 for virus X immunity, and 38 for both late blight and virus X immunity. Seedlings showing susceptibility to late blight and virus X are discarded at an early age and only the apparently resistant ones are transplanted and grown in the greenhouse.

During 1955 approximately 24,240 North Dakota and 500 Manitoba first-year seedlings were grown in the field at the Langdon Experiment Station. From these, 950 clones were selected at harvesttime for further testing and evaluation.

Deceased December 17, 1955.

Many of the clones selected possessed a high degree of resistance to scab, late blight, and viruses X and Y, in combination with red and white skin color, russet skin type and good tuber type. Many of the desirable russet skin types selected were progenies of the russet skin variety Russet Burbank.

Advanced Selections

Advanced selections were grown under isolation from virus diseases at Langdon and with variable field exposure to various diseases at Grand Forks. A summary of seedling and selections grown and those saved at harvesttime for further testing follows:

<u>Age of Clones</u>	<u>No. grown</u>	<u>No. selected</u>
1st year seedlings	24,740	950
2d " selections	481	121
3d " "	81	43
4th " "	63	43

Red-skin selections ND 2910-1R, ND 2774-3R and ND 2906-1R were distributed to foundation seed growers for increase in 1955. North Dakota selection ND 457-1-10, ND 457-1-16, ND 2231-2, Manota and ND 2124-2R distributed to foundation seed growers for increase in 1954, were replanted in 1955. White-skin selection ND 457-1-10 has the largest increase of newly distributed material at the present time, approximately 500 bushels were harvested this fall. ND 2910-1R, a selection with many good horticultural characteristics, has the largest increase of all red-skin varieties. Both ND 2906-1R and ND 2774-3R were also given favorable reports where grown in 1955. In addition to the selections distributed to foundation seed growers for increase numerous advanced selections are being grown for further testing and evaluation at Fargo, Northwood, Grand Forks, Park River, and Langdon. Many of these selections possess a high degree of late blight resistance, immunity to virus X, and resistance to common scab.

Test for Disease Resistance

The greenhouse test for field resistance to virus Y was again conducted in 1955. On January 5, 382 seedling tubers resulting from crosses with ND 457-1 were planted in individual pots in the greenhouse. On March 1 viruliferous aphids were placed on all the inoculum plants of ND 530 and on as many seedling plants as possible. The aphids were allowed to spread the virus as rapidly as possible and on March 9 they were killed by fumigation. At this time, 25 individual plants showed no symptoms and were harvested on March 15 to be replanted in the field on May 3 for another virus Y exposure test. Three more advanced clones were again tested in the field for resistance or susceptibility to virus Y.

Of 48 advanced clones tested 3 showed complete resistance to race 0 of late blight. Of 38 advanced clones when tested for virus X 16 showed immunity.

The scab plot at Fargo included 141 second-year and 137 third-year and older selections, while 137 selections were also grown in the Northwood scab plot. Favorable scab tests were again obtained in both of these trials.

Variety Trials

Early Harvest Variety Trial, Red Variety Trial, State-wide Variety Trial, and North Central Regional Variety Trial were conducted in 1955. All variety trials were grown with 4 replications of 25 trial plants and 2 buffer plants each except the Early Harvest Variety Trial in which 2 replications were grown for each harvest date and location. Appropriate fertilizer applications were made at planting time. Trials were dusted or sprayed regularly to control insects. Location, planting and harvest dates, soil type and fertilizer used follow:

Location	Dates planted	Dates harvested	Soil type	Fertilizer applied
Early Harvest Trial				
Grand Forks	May 5	Aug. 1 15 29	Bearden Clay Loam	200 lbs. 0-30-15
Park River	May 6	Aug. 1 15 29	Clyndon Silt Loam	200 lbs. 0-30-15
Red Trial				
Grand Forks	May 11	Sept. 16	Bearden Clay Loam	200 lbs. 0-30-15
North Central Regional Trial				
Grand Forks	May 11	Sept. 16	Bearden Clay Loam	200 lbs. 0-30-15
State-wide Trial				
Irrigation Williston	May 16	Sept. 17	Havre Loam	350 lbs. 20-20-0
Dryland Williston	May 14	Sept. 19	Williams Loam	200 lbs. 0-45-0
Park River	May 20	Sept. 14	Clyndon Silt Loam	200 lbs. 0-30-15
Grand Forks	May 11	Sept. 16	Bearden Clay Loam	0-30-15
Minot	May 11	Sept. 24	Loam	None
Fargo	May 10	Discarded at harvest	Fargo Clay	None

Early Harvest Trial

The Early Harvest Variety Trial was grown for the first time this year. The principal objective sought in growing an early harvest variety trial was to study the relationship between yield, specific gravity, silver scurf, bruising resistance, and scab resistance of 10 early-maturing varieties in trial and 4 late-maturing varieties. The early-maturing varieties were Early Gem, Triumph, Manota, Red Warba, ND 457-1-10, ND 457-1-16, ND 2728-20R, ND 2774-3R, ND 2555-12R and ND 2906-1R. The late-maturing varieties were Kennebec, Red Pontiac, ND 2124-20R and ND 2910-1R. Early selections ND 2906-1R, ND 457-1-10, and ND 457-1-16 looked promising at all harvest dates. On August 1 all 3 selections yielded either above or equal to the early check varieties, but the differences in most cases were not statistically significant. All 3 selections continued to make substantial yield increases at each subsequent harvest date. ND 2910-1R and all late-maturing varieties had very poor yields on August 1 but made substantial yields by August 29. Kennebec, a late-maturing variety, had a good yield at almost all digging dates which supports the opinion that Kennebec, which is a late-maturing variety, does set its tubers early. At Park River, Early Gem had an average yield at 3 harvest dates of 119.3 bushels per acre compared with Red Warba with 163.8 and ND 2906-1R with 204.8 bushels per acre.

The average specific gravity for all varieties at both locations was lowest (1.068) at the first harvest date on August 1. This increased to 1.078 on August 15 and decreased to 1.076 on August 29. Late-maturing varieties such as Kennebec and ND 2910-1R made substantial gains in specific gravity at all harvest dates. Yield, specific gravity, and percent U.S. No. 1 are reported in Johansen tables 1, 2 and 3, respectively.

Red Trial

The Red Trial grown at Grand Forks consisted of 8 named varieties and 12 unnamed advanced selections. Data from this trial are reported in Johansen table 4. Redkote and Red LaSoda were the most promising named red varieties in the trial. Redkote is a scab-resistant variety developed by Ben Picha, Grand Forks, N. Dak. Red LaSoda is a mutation of the variety LaSoda differing only in a more desirable red skin color. Red Beauty, a variety recently named jointly by the Wisconsin Experiment Station and the North Dakota Experiment Station, had a low yield and small size tubers and was very susceptible to silver surf. ND 2910-1R and ND 2906-1R were the most promising advanced selections in the trial. Tubers of 2910-1R were smooth with shallow eyes, good type, good red skin color, and very uniform. ND 2906-1R is a high-yielding, early selection, producing tubers of good type, smooth but pale red skin color, and low specific gravity.

Johansen table 1. Average yield in bushels per acre of 14 varieties grown in Early Harvest Trials, 1955.

Variety	Maturity	Yield per acre, three harvest dates										Ave. Average of 3 harvest dates			
		Aug. 1		Aug. 15		Aug. 29		Ave. both loc.		Park River		Grand Forks		both loc.	
		Park River	Bu.	Grand Forks	Bu.	Park River	Bu.	both loc.	Bu.	Park River	Bu.	Grand Forks	Bu.	both loc.	Both locations
ND 2906-1R	VE	183	233	233	208	252	162	207	284	219	239	205	251	239	222
ND 457-1-16	E	238	186	186	212	249	198	223	249	209	245	198	229	245	222
ND 457-1-10	VE	192	177	177	184	209	154	181	289	205	230	179	247	230	204
Red Pontiac	ML	151	141	141	146	229	146	187	331	195	237	161	263	237	199
Triumph	E	203	169	169	186	234	155	194	265	161	234	161	213	234	198
Red Warba	VE	201	174	174	187	198	139	168	260	177	219	164	218	219	192
ND 2723-20R	E	194	159	159	176	219	133	176	241	170	213	154	205	213	186
Kennebec	L	159	115	115	137	200	146	173	298	190	219	150	244	219	185
ND 2910-1R	ML	123	74	74	98	207	155	181	285	225	205	150	255	205	178
ND 2555-12R	E	184	144	144	164	236	128	182	243	130	221	134	186	221	177
Manota	E	204	118	118	161	195	118	156	246	130	215	123	188	215	177
ND 2124-20R	ML	178	132	132	155	211	122	166	252	165	214	140	208	214	169
Early Gem	E	184	79	79	131	191	128	159	256	151	210	119	203	210	165
ND 2774-3R	VE	163	130	130	146	173	107	140	195	123	177	120	159	177	148
Average		183	145	145	164	215	142	178	264	175	220	154	219	220	187
L.D.D. 5%		69	35	35	69	69	35	69	69	35	40	20			

Johansen table 2. Specific gravity of 14 varieties grown in Early Harvest Trials, 1955. 1/

Variety	Maturity	Specific gravity, three harvest dates									
		Aug. 1		Aug. 15		Aug. 29		both loca.		Ave. three harvest dates	
		Park River	Grand Forks	both loca.	Park River	Grand Forks	both loca.	Park River	Grand Forks	Park River	Grand Forks
ND 2728-20R	E	1.075	1.077	1.076	1.086	1.083	1.084	1.078	1.077	1.077	1.079
ND 2124-29R	ML	1.074	1.069	1.071	1.082	1.086	1.084	1.080	1.083	1.081	1.079
Red Warba	VE	1.075	1.072	1.073	1.082	1.085	1.083	1.081	1.081	1.081	1.079
ND 2910-1R	ML	1.067	1.069	1.068	1.077	1.081	1.079	1.083	1.084	1.083	1.077
Manota	E	1.070	1.069	1.069	1.085	1.086	1.085	1.077	1.079	1.078	1.077
ND 457-1-10	VE	1.073	1.067	1.070	1.085	1.079	1.082	1.080	1.074	1.077	1.073
ND 457-1-16	E	1.070	1.068	1.069	1.086	1.080	1.083	1.081	1.075	1.078	1.076
ND 2555-12R	E	1.072	1.072	1.072	1.078	1.081	1.079	1.075	1.075	1.075	1.075
ND 2774-3R	VE	1.074	1.074	1.072	1.078	1.075	1.076	1.077	1.072	1.074	1.074
Kennebec	L	1.066	1.062	1.064	1.079	1.072	1.075	1.082	1.077	1.079	1.073
Triumph	E	1.066	1.067	1.066	1.078	1.073	1.075	1.074	1.071	1.072	1.071
ND 2906-1R	VE	1.064	1.068	1.066	1.074	1.069	1.071	1.067	1.064	1.065	1.067
Early Gen	E	1.066	1.059	1.062	1.074	1.069	1.071	1.072	1.065	1.068	1.067
Red Pontiac	ML	1.061	1.060	1.060	1.069	1.069	1.069	1.072	1.070	1.071	1.066
Average		1.069	1.068	1.068	1.079	1.077	1.078	1.077	1.075	1.076	1.074
L.S.D. 5%		.004	.004	.004	.004	.004	.004	.004	.004	.002	.002

1/ Specific gravity determined by the use of the National Potato Chip Institute potato hydrometer, using an 8 - pound sample from each replication.

Johansen table 3, Percent U.S. No. 1 of 14 varieties grown in the Early Harvest Variety Trials, 1955.

Variety	Maturity	U.S. No. 1 Three harvest dates											
		Aug. 1			Aug. 15			Aug. 29			Ave. 3		
		Pct.	Park River	Grand Forks	Ave. both loca.	Pct.	Park River	Grand Forks	Ave. both loca.	Pct.	Park River	Grand Forks	Ave. both loca.
		Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
2728-20	E	78	75	76	88	82	90	87	88	85	81	83	83
2124-20	ML	86	77	81	91	95	90	89	89	89	87	88	88
457-1-10	VE	91	87	89	92	93	95	93	94	93	91	92	92
Red Pontiac	ML	85	89	97	94	98	97	96	96	92	94	93	93
2555-12	E	83	81	81	85	89	91	92	91	86	87	87	87
Manota	E	90	76	83	86	89	94	96	95	90	87	89	89
457-1-16	E	96	94	95	97	87	97	90	93	97	90	94	94
Red Warba	VE	92	88	90	91	94	95	94	94	93	92	92	92
Kennebec	L	85	87	86	95	93	95	97	96	92	92	92	92
2910-1R	ML	48	36	42	91	84	95	93	94	78	71	75	75
2774-3	VE	86	63	74	90	77	93	87	90	90	76	83	83
Triumph	E	90	87	88	94	96	90	94	92	91	92	93	93
2906-1R	VE	91	91	91	94	94	98	95	96	94	93	94	94
Early Gem	E	88	52	70	87	88	92	76	84	89	72	81	81
Average		85	77	81	91	90	94	91	92	90	86	88	88

Johansen table 4. Red Variety Trial. Total yield in bushels per acre, percentage U.S. No. 1, and specific gravity of 20 red varieties grown at Grand Forks, N. Dak., 1955.

Variety	Yield per acre		Specific ^{1/} gravity
	Total	U.S. No. 1	
	Bu.	No.	
ND 2910-1R	241	94.1	1.075
Red Pontiac	226	96.8	1.066
Red LaSoda	211	92.2	1.067
ND 2906-1R	208	93.2	1.065
Redkote	192	85.5	1.073
Triumph	192	93.5	1.069
LaSoda	191	93.6	1.070
Redburt	186	95.2	1.069
L.D. 82-269	185	89.2	1.083
Redglo	180	89.3	1.070
ND 2124-20R	177	90.0	1.079
ND 3203-6R	175	92.3	1.061
Red Warba	175	88.4	1.078
ND 2728-20R	142	83.6	1.076
ND 2976-2R	139	93.4	1.081
ND 2555-12R	135	88.5	1.076
ND 2555-6R	122	86.7	1.072
ND 2774-3R	110	84.5	1.071
Red Beauty	107	75.8	1.078
ND 2124-2R	94	91.1	1.080
Average	170	89.8	1.073
L.S.D. 5%	46		.004
" 1%	61		.006

^{1/} Specific gravity was determined by the use of the National Potato Chip Institute potato hydrometer, using 8-pound samples from each of 2 replications.

State-Wide Variety Trial

The State-wide Variety Trials were grown at Grand Forks, Park River, Minot, and Fargo, and without irrigation at Williston. The trials included 13 varieties and selections grown at all locations, with an additional 7 selections grown at Fargo and Park River, and 8 at Grand Forks. The Fargo trial was discarded at harvesttime due to irregular yield as the result of flooding. Data from these trials are reported in Johansen tables 5 and 6.

Outstanding entries in this trial were ND 2910-1R and ND 2906-1R, although ND 457-1-10, ND 457-1-16, ND 457-1-35 and ND 2231-2 all yielded well with good

tuber types. Red Pontiac yielded very well at all locations. ND 3224-1, a russet-skin North Dakota selection, was almost identical with Early Gem. ND 457-1-36, ND 2231-2, and ND 2929-8R were highest in specific gravity, while ND 2906-1R, ND 3224-1, Red Pontiac, and Early Gem were all low in specific gravity at all locations. At Grand Forks and Park River ND 2929-8R was outstanding with an average specific gravity of 1.090.

Johansen table 5. Total yield in bushels per acre and average percentage U.S. No. 1 potatoes grown in State-Wide Trials, 1955.

Variety	Yield per acre and location						Average per acre 1/ U.S. #1 Pct.	
	Park River	Grand Forks	Minot	Williston Dryland	Irrig.			
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.		
Red Pontiac	235	233	258	202	513	288		93.3
ND 457-1-16	260	265	214	181	474	279		91.4
ND 2906-1R	278	221	232	199	457	277		92.0
ND 2910-1R	262	238	223	179	467	274		91.8
ND 2231-2	285	270	210	175	355	259		89.3
Triumph	238	193	234	189	378	246		91.2
Early Gem	239	198	217	143	398	239		87.6
ND 2124-2OR	249	199	199	150	394	238		89.8
ND 457-1-35	236	212	197	164	345	231		91.1
Manota	184	215	198	164	392	231		89.2
ND 2555-12R	237	156	191	153	404	228		90.5
ND 2728-2OR	222	157	194	150	412	227		85.0
ND 2774-3R	139	105	172	132	300	170		88.6
ND 3152-1	295	276				286		91.3
ND 2929-8R	267	264				265		87.4
ND 457-1-10	267	246				257		90.8
ND 457-1-36	252	222				237		92.5
ND 3224-1	256	199				227		89.3
ND 2962-4	204	170				187		91.6
ND 3268-4	183	179				181		73.9
Wash. 137-5		201				201		90.5
Average	239	210	211	168	407	239		89.4
L.S.D. 5%	48	51	98	32	30			
" 1%	64	67	132	43	41			

1/ Average yield of first 13 varieties was 245 bushels per acre and the percentage U.S. No. 1 was 90.8.

Johansen table 6. Specific gravity of potato varieties grown in State-Wide Trials in 1955. ^{1/}

Variety	Park River	Grand Forks	Minnot	Williston		Average ^{2/}
				Dryland	Irrig.	
ND 2231-2	1.090	1.082	1.081	1.083	1.087	1.085
ND 2728-20R	1.082	1.076	1.081	1.083	1.088	1.082
ND 2124-20R	1.081	1.079	1.077	1.083	1.088	1.082
ND 2910-1R	1.087	1.074	1.075	1.081	1.087	1.081
Manota	1.084	1.077	1.077	1.080	1.086	1.081
ND 457-1-16	1.083	1.075	1.077	1.082	1.081	1.080
ND 457-1-35	1.083	1.075	1.074	1.079	1.084	1.079
ND 2774-3R	1.075	1.073	1.073	1.077	1.085	1.077
ND 2555-12R	1.074	1.071	1.068	1.080	1.081	1.075
Triumph	1.075	1.068	1.072	1.074	1.077	1.073
ND 2906-1R	1.069	1.065	1.071	1.077	1.079	1.072
Early Gem	1.069	1.065	1.069	1.068	1.075	1.069
Red Pontiac	1.069	1.062	1.065	1.069	1.072	1.067
ND 2929-8R	1.091	1.092				1.092
ND 457-1-36	1.088	1.083				1.086
ND 457-1-10	1.083	1.075				1.079
ND 3152-1	1.077	1.072				1.075
ND 3268-3	1.071	1.070				1.071
ND 2962-4	1.072	1.065				1.069
ND 3224-1	1.069	1.064				1.067
Nash 137-4		1.075				1.075
Average	1.079	1.073	1.074	1.078	1.082	1.077
L.S.D. 5%	.004	.003	.006	.006	.004	
" 1%	.005	.005	.008	.009	.006	

^{1/} Specific gravity was determined by the use of the National Potato Chip Institute potato hydrometer, using an 8-pound sample from each 2 reps.

^{2/} Average of first 13 varieties was 1.078.

North Central Regional Variety Trial

The North Central Regional Variety Trial grown at Grand Forks included 8 advanced selections and 3 check varieties. Four North Central States had the following selections entered: Iowa, I 803-3; Michigan, M 1363; North Dakota, ND 457-1-10, ND 457-1-16, ND 2910-1R; and Wisconsin, D 27.50, W 0103.51, S1.55. The most promising entries in the trial were ND 2910-1R and W 0103.51, both of which produced tubers of very nice size and type although the latter appeared to be somewhat late in vine maturity for North Dakota.

NORTH DAKOTA
Wm. G. Hoyman

The temperature and rainfall during August were abnormal for the Red River Valley. Higher temperatures than normal and 0.97 inches of rain at the Northwood Station were factors causing a low yield. The first killing frost was September 10.

The Irish Cobbler and Triumph acreages continued to decrease. Red Pontiac was the leading variety and a few growers had small acreages of LaSoda and Red LaSoda entered for certification. A few farmers increased the new red skin variety Redkote. The North Dakota Department of Horticulture released 5 selections that have shown promise in the State. Two of the 5 have red skin. Early Gem continued to increase in North Dakota, Minnesota, and Wisconsin.

Aphids have not been much of a problem and this probably accounts for the low virus count in seed stocks. Flea beetle damage was observed on the tubers at a few locations. This type of injury is uncommon in the Red River Valley.

Considerable interest was shown in the use of antibiotics for seed treatment. Many growers used streptomycin or some preparation containing streptomycin and terramycin. After one year's experience, many growers still prefer the acid-mercury dip treatment.

A new NCL dust was used by several growers. This material contained copper, iron, zinc, boron, manganese, sulfur, and 2,4-D. It was recommended for increasing the yield and inciting red-skin varieties to have a brighter red skin. The manufacturers claimed the application of the dust to the foliage would reduce common scab. The 1955 results were disappointing but skin color showed improvement. Terraclor, pentachloronitrobenzene, was applied to the soil in an attempt to reduce scab infection and some reduction was obtained.

Potato Seed Treatments

Agri-mycin 100 and 9 other treatments were used to determine their effectiveness in reducing blackleg in the Sebago variety. The Agri-mycin 100 dust and dip were used at 200 p.p.m. The seed was known to be infected with the bacterium causing this disease.

The least amount of blackleg occurred in the plants grown from seed treated with acid-mercury. Agri-mycin 100 dip was the next most effective treatment but the Agri-mycin 100 dust was comparable to the check. The acid-mercury treatment injured the cut seed and reduced the yield.

A greenhouse experiment was conducted with the same Sebago seed to determine the effect of 30- and 60-minute dip treatments with Agri-mycin 100. The results in table 1 show the 60-minute treatment was much more effective than the 30-minute treatment. The emergence and subsequent growth appeared normal.

North Dakota table 1. Effect of 30- and 60-minute dip treatments on the occurrence of blackleg.

Seed pieces	Treated	Visible blackleg plants	Blackleg
No.	Minutes	No.	Pct.
348	60	15	4.31
348	30	35	10.05
348	none	108	31.03

Seed Stocks Free of Virus X

The varieties Red Pontiac, Early Gem, Kennebec, and Cherokee are being maintained free of virus X and other viruses. Seed is indexed in the greenhouse each spring before it is planted at an isolated location. This virus-free seed is a source of foundation stock for certified growers. As soon as new varieties are increased in North Dakota they are included in this program.

Scab Resistance

Twenty-six entries and Irish Cobbler were included in the National Uniform Scab Nursery Trial conducted at Fargo, N. Dak. The results in table 2 show B 3429-11 remained free of scab and Early Gem continued to show its high degree of resistance. The letter "C" following a reading indicates a cracking type of abnormality which may or may not be due to the scab organism.

One hundred and thirty-three selections from the North Dakota Department of Horticulture were planted at Northwood where russet scab was severe. The selections ND2477-1, ND3357-11, ND3369-4, ND3435-17, ND3501-3, ND3562-2, ND3652-18 and ND3224-1 did not show scab symptoms. Other highly resistant selections with a 1-1 reading were ND3371-1, ND3415-10, ND3422-2, ND2972-2R and ND2200-1R. Twenty others showed a 1-2 scab reading.

The data obtained from the Fargo and Northwood Trials indicated progress is being obtained in developing varieties having resistance to the strains of Streptomyces scabies present in North Dakota.

N. Dak. table 2. Scab readings of entries included in the National Uniform Scab Nursery Trial, Fargo, N. Dak.

Variety	Total number tubers	Number of tubers showing types of scab infection				
		0	1	2	3	4
B 3429-11	33	33				
Early Gem	50	48	1C	1C		
B 3428-31	88	80	6	2		
B 73-10	73	56	10	7		
Cherokee	95	64	17	14		
I801-10	208	163	25	20		
B 2879-4	89	14	20C	55C		
B 3006-22	51	27	11	12	1	
B 3114-52	63	21	29C	12C	1C	
B 3309-4	104	68	25	9	2	
B 3309-2	57	21	23	11	2	
B 2887-2	28	23		2C	3C	
B 3428-29	37	27	5	2	3	
Ontario	36	19	7C	6C	4C	
B 3458-12	53	29	12	8	4	
B 3107-17	75	52	2	17	4	
B 3428-41	76	50	4	18	4	
B 3458-13	135	100	17	13	5	
B 3170-33	78	41	12	20	5	
B 3140-36	39	22	5C	6C	6C	
I803-3	145	103	9	20	13	
B 3004-9	74	19	11	29	15	
B 3428-8	47	39	3		2	3
Menominee	41	5	1C	5C	27C	3C
B 3453-2	58	9	2C	16C	19C	12C
B 3454-14	41	1		1C	27C	12C
Irish Cobbler	Type 3 was common					

Virus Y Resistance

Thirty selections from the North Dakota Department of Horticulture and four from the United States Department of Agriculture were included in the virus Y plot at Fargo. Each selection was mechanically inoculated in the field June 28 when the plants were small. ND530, a carrier of virus Y, was planted throughout the plot to serve as a source of inoculum for insect transmission. Six of the horticultural selections and one from the Federal government showed symptoms of virus Y before the first killing frost September 10. Among the North Dakota selections showing resistance were ND457-1-10, ND457-1-16, ND457-1-35 and ND457-1-16. A similar test in 1954 indicated ND457-1-10 did not have as much resistance as the other three inbred sisters.

Late Blight Resistance

Considerable emphasis is being given to the development of varieties resistant to late blight. The inoculations are made in a large chamber equipped with automatic temperature and humidity controls. Several flats or many potted plants may be placed in the chamber making it possible to inoculate large numbers within a short period. Detached leaves were also used whenever it was not convenient to use potted plants.

Table 3 lists the pedigrees of some seedlings tested for resistance to race 0. It is interesting to note the low percentage of susceptibility where 3XX-1, 3WM-19 and B 1859 appeared in the pedigrees.

N. Dak. table 3. North Dakota Department of Horticulture seedlings tested for resistance to race 0.

Pedigree	Parentage	Susceptible	Pedigree	Parentage	Susceptible
		Pct.			Pct.
4151	Early Ohio x ND3203-6R	100	4307	GQT-1-3 x WX137	10
4153	Kennebec x B 1396N2	20	4310	" x ND2910-1R	10
4154	" x ND3423-4R	20	4315	ND457-1 x ND3203-6R	100
4176	Redkote x ND3203-6R	100	4383	ND3203-6R x Minn. 21	100
4182	Red Pontiac x ND3203-6R	100	4384	" x WX137	40
4206	B 922-3 x Osage	100	4385	" x ND457-1	100
4207	" x WX125	90	4386	" x ND457-1-10	100
4208	" x ND 2853-3R	80	4387	" x B 1859	5
4209	" x ND 2910-1R	50	4388	" x B 2876-1	20
4210	" x ND3023-B-3R	25	4389	" x ND3023-B-3R	100
4215	B 922-6 x "	25	4391	" x B 3131N2	30
4216	" x ND3024-B-10R	25	4392	" x Redkote	100
4219	" x I1060-1	25	4417	ND3291-1 x B 1396N2	20
4241	3XX-1 x ND2910-1R	1	4418	" x ND2910-1R	40
4243	3WM-19 x GQT-1-3	10	4419	" x ND2906-1R	20
4244	" x ND457-1	10	4421	ND3291-5 x Minn. 24	10
4245	" x ND2910-1R	1	4424	" x B 1396N2	25
4247	TI-15 x ND2728-20R	10	4425	" x ND29101R	25
4248	" x ND457-1	25	4426	" x ND3356-3	50
4258	I1060-1 x ND3291-5	20	4427	" x Redkote	40
4266	M24 x ND3203-6R	100	4432	ND3295-6 x ND457-1	25
4300	475M2 x "	100	4439	" x ND2906-1R	20
4304	2TG-15-3 x ND457-1-10	90	4436	ND3296-1 x ND457-1	30
4305	" x ND2906-1R	50	4437	" x ND2910-1R	20
4306	" x Redkote	75			

Preliminary tests were made to compare the reaction of attached and detached leaves. There are occasions when it isn't possible to inoculate an entire plant. During the growing season it would not be convenient to move a plant

to the chamber but leaves can be removed and sent via air mail for many miles. Thirty selections were selected to make such a comparison, and the results indicated the detached leaf method was very reliable. There was only one instance where the 2 methods gave divergent reactions. Fruiting of the pathogen occurred on the attached leaves of one selection, whereas the detached leaves had necrotic lesions without fruiting.

Maintenance of Federal Stock from Iowa

Parental lines and selections from Dr. A. E. Kehr's breeding program are grown each year in an isolated plot at Northwood. Two hundred and sixty were in the 1955 plot. In addition to the isolation, another advantage provided by this location is the opportunity to select for scab resistance. Susceptible selections are generally affected with russet scab.

Increase of Seed for the Texas Experiment

Five varieties and 109 advanced selections were increased at Northwood as a source of seed for the trial at the Texas Substation No. 15, Weslaco, Tex. Thirty-three were selected for the replicated Texas trial (table 4) and small samples of each were sent to the Subtropical Experiment Station, Homestead, Fla., for an observational plot.

In a similar test conducted in 1954, Red LaSoda and Red Pontiac were the highest yielders in the late and medium maturity classes, respectively.

N. Dak. table 4. Selections to be planted at Weslaco, Texas, and Homestead, Fla.

Selection	Late 1/ blight	2/ Scab	Matur- ity	Silver3/ scurf	Tuber color	Remarks
<u>North Dakota</u> (Johansen, Schultz and Hoyman)						
457-1-10	+	1-4	E	0	White	
457-1-16	+	1-3	E	0	"	
457-1-35	+	4-3	M	2	"	
457-1-36	+	1-3	M	2	"	
2200-1R	+	1-4	M	2	Red	
2124-2R	+	1-3	E	2	"	
2231-2	+	1-3	M	0	White	
2555-6R	+	1-3	E	2	Red	
2728-20R	+	3-3	E	3	"	
2799-5R	+	3-4	M	1	"	Too much scab
2774-3R	+	2-4	E	3	"	
2910-1R	+	1-3	L	3	"	
3022-18	+	1-4	M	0	White	
3022-29	-	1-3	M	1	"	
3203-6	+	1-3	E	3	Red	

N. Dak. table 4 continued

Selection	Late 1/ blight	2/ Scab	Matur- ity	Silver3/ scurf	Tuber color	Remarks
<u>North Dakota (Johansen, Schultz and Hoyman)</u>						
I9100-3	+	1-4	M	1	White	
Cherokee	-	1-2	M	1	"	
Redkote	+	1-2	L	2	Red	
Kennebec	-	1-2	L	1	White	
Red Pontiac	+	1-3	M	2	Red	
<u>Wisconsin (Rieman)</u>						
A.G.10.54	+	2-4	E	2	Red	
1301	+	1-3	M	2	"	
<u>Minnesota (Krantz)</u>						
119	+	1-2	L	1	White	Rough
<u>U.S.D.A. (Stevenson)</u>						
3309-8	-	1-3	M	1	Red	Long
3452-15	+	2-2C	M	0	Red	
<u>U.S.D.A. Colorado (Edmundson)</u>						
11012	+	1-3C	E	1	Red	
<u>Louisiana (Miller)</u>						
Red LaSoda	+	1-4	L	1	Red	Rough, big
82-94	+	2-4	M	1	"	Rough
<u>U.S.D.A. Louisiana (Dykstra)</u>						
3865	-	1-3C	E	1	White	Rough, long
4145						Rogued
1859	-	1-1	M	1	Pale	
<u>Nebraska (Werner)</u>						
82.49-1X	+	0	L	1	Red	Fusarium wilt
131.50-2	+	1-4	M	2	"	" "
215.50-2	+	1-4	M	1	"	" "

1/ Late blight. + = Susceptible to race 0. - = Resistant to the same race.

2/ Scab. The system used by the U.S.D.A. was used for the readings. C following a reading means a "cracking type" of abnormality. This may or may not be due to scab infection.

3/ Silver scurf. 0 = No infection; 1 = Slight, 2 = Moderate, and 3 = Severe.

The Northwood Seedling Plot

Approximately 5,000 seedling tubers are planted in the Northwood seedling plot each year. The 1955 planting included tubers obtained from F. J. Stevenson, A. E. Kehr, John McLean, Wm. G. Hoyman, R. H. Johansen and J. H. Schultz. The plot is located on the Aldrich Farm in an area where commercial potatoes are not grown because of russet scab. Since a large percentage of the tubers become infected each year, it is possible to eliminate the susceptible progeny after one year's test. Some information regarding the 38 single hills saved from the 1955 plot is given in table 5. In addition to scab resistance, a majority of the single hill selections were resistant to late blight and immune to virus X.

Seventy advanced selections were increased in the same plot and 29 of these had russet skin and were furnished by John McLean. The eight selections saved for further increase are given in table 6.

N. Dak. table 5. Seedling hills saved from the 1955 seedling plot.

Pedigree	Number hills	Skin color			
		White	Red	Slightly russet	Russet
A313	1				1
B3837	1	1			
B3842	1	1			
B3836	1	1			
F26	10	2	1	3	4
F29	1			1	
11332	1	1			
11374	1	1			
11379	1	1			
ND3967	1		1		
ND3968	3		3		
ND3970	1		1		
ND3977	2		2		
ND3981	1		1		
ND3982	1		1		
ND4011	1		1		
ND4033	1	1			
ND4041	2	1		1	
ND4042	4	3		1	
ND4071	1		1		
ND4073	1		1		
ND4096	1	1			

N. Dak. table 6. Selections saved for further testing.

Pedigree	Parentage	Skin color	Maturity	Known resistance
B 3626-5	B 595-76 x B 2067-52	White	L	Sc, LB, X
B 3627	B 606-37 x "	"	L	" " "
B 3651-4	B 606-37 x Cherokee	"	M	" " "
B 3651-8	" x "	"	M	" " "
F19-1	B 874-24 x Redkote	Russet	M	Sc
All9-1	Russet Burbank x A102-35	"	M	Sc
A173-9	Early Gem x B 2756-6	"	M	Sc
A173-10	" x "	"	L	Sc

NCL Dust

A new NCL dust was applied to the foliage by a few potato growers in 1954. The distributors of this dust claimed it would increase the yield, reduce the amount of common scab, and add more red color to red varieties. Because of these claims an experiment was conducted at Northwood in an area where russet scab has caused growers to discontinue planting potatoes. The dust contained 1 percent acid equivalent isopropyl ester of 2,4-D and the following compounds:

Compounds	Elemental content equivalent	Pct.
Sulfur	Sulfur	17.8
Manganese sulfate	Manganese	4.8
Copper sulfate, monohydrate	Copper	2.6
Zinc sulfate	Zinc	3.2
Ferrous sulfate, monohydrate	Iron	3.8
Borax	Boron	1.0

Red Pontiac vines were dusted at the rate of 6.2 pounds per acre July 7, July 19, and August 3. Slight 2,4-D injury was observed soon after the first application, and it remained all summer. There was neither a significant increase in yield nor a reduction in the amount of russet scab, but there was a slight improvement in the color of the tubers harvested from the treated vines. It is possible the lack of rainfall (.97 inch) during August affected the yield.

In a greenhouse experiment where three applications of the sodium salt of 2,4-D were sprayed on Triumph foliage at 62.5 p.p.m., a slight increase in the amount of scab infection occurred on the tubers harvested from the treated vines.

Maintenance of Potato Viruses X and Y by Freezing

The expressed juice from Nicotiana glutinosa containing a virulent strain of X was capable of infecting tobacco and potato 44 months after the juice was frozen.

Three strains of virus Y were obtained from N. glutinosa and each was still virulent 6 months after the juice was frozen.

The Brown-Ring Test for Pathogenicity of Streptomyces scabies

Seventeen Streptomyces species were grown in sterilized skim milk to determine if they would give the brown-ring reaction. Each culture was tested for pathogenicity on six varieties of potatoes. The results indicated the brown-ring reaction was not entirely reliable. Cultures 3, 9 and 10, producing brown, light brown, and brown rings, respectively, were not pathogenic. Five cultures not giving the reaction proved to be nonpathogenic, while the remaining nine were pathogenic and produced the color reaction.

Terraclor for Scab Control

Terraclor, pentachloronitrobenzene, was furnished by the Olin Mathieson Chemical Corporation to test in an area where russet scab has become a severe problem. The Terraclor was applied with an EZ flow fertilizer spreader, and after application the plot was cultivated 4 times with a tool bar cultivator. The rates of application were 50, 100, and 150 pounds per acre. Observations during the growing season indicated the 150-pound rate delayed the emergence of the Red Pontiac plants and reduced the stand. Some injury was also noticed at the 100-pound rate. The results in table 7 were obtained from 50-pound samples and show a reduction in russet scab at all rates of application.

Yield data were not included because the applications were not replicated. Reduced yields occurred at the two higher rates, especially on the plot receiving 150 pounds.

N. Dak. table 7. Effect of Terraclor in reducing russet scab on Red Pontiac.

Treatment	Number tubers	Number of tubers		No scab Pct.
		Scab	No scab	
Check	112	81	31	27.6
50 lbs.	103	68	35	33.9
100 "	99	29	70	70.7
150 "	104	19	85	81.7

OHIO

J. P. Slesman

Drought conditions occurred at Wooster during the 1955 growing season. Rainfall exceeded the average in July only, and was deficient in April, May, June, August, and September. Temperatures were considerably above normal for all summer months except June, which was 3.9 degrees below normal. Flea beetle populations were about average, but potato leafhopper populations were unusually high in late July, August, and early September. Leafhopper populations on unsprayed Irish Cobbler potatoes averaged approximately 20 nymphs per leaf, resulting in premature death of the plants and a 50% reduction in yield.

The object of the insect-resistant program has been to combine in one horticulturally acceptable variety resistance to potato leafhoppers, flea beetles, and aphids. Emphasis has been placed on developing a desirable variety resistant to the potato leafhopper, since in Ohio this insect is by far the most important of the foliage-attacking pest complex.

Approximately 3,400 seedlings, representing 29 progenies, and 1,600 seedlings, representing 19 progenies, were received from F. J. Stevenson and A. E. Kehr, respectively. These were screened for resistance to the potato leafhopper and about 5% were saved for planting and further study in 1956. Leafhopper populations were very high in this planting and none of the seedlings escaped injury. Variations in leafhopper populations and degree of injury occurred among the seedlings of various progenies but none was immune to attack. This was true also for more than 100 advanced selections. Leafhopper counts and hopperburn ratings showed that some seedlings were resistant to leafhopper attack and that others were tolerant; i.e., they supported a fairly large population without suffering appreciable hopperburn. In most instances where resistance or tolerance was indicated, the seedlings were of late maturity.

Solanum species and species hybrids, provided by Hougas, Kehr, and Stevenson, were studied. Many of the species were found to be highly resistant to the potato leafhopper (see previous reports for ratings). Species hybrids involving chacoense were quite resistant in mid-summer but the population increased as the summer advanced and the plants became more mature.

PENNSYLVANIA
J. S. Cobb

At the State University Experimental Station, 10 early, 14 medium and 8 late varieties of potato were tested for yield and dry-matter content. The results of these tests are given in Pa. table 1.

Pa. table 1. Varietal yield test at Pennsylvania State University 1955.

Variety	Average yield	U.S. No. 1	Dry matter
	U.S. No. 1 per acre		
	Bu.	Pct.	Pct.
<u>Early</u>			
Triumph	193	69	15.1
Cobbler (Potter Co.)	206	75	17.2
Cherokee (Maine)	172	60	16.9
Cobbler (U.S.D.A.)	196	68	16.9
Cherokee (U.S.D.A.)	169	60	16.4
Redkote	334	79	16.5
Redglo	178	46	16.3
Red Warba	137	60	16.6
Early Ohio	111	56	18.2
Early Rose	209	60	18.4
Chippewa	327	74	16.2
Delus	395	90	20.2
L.S.D. .05	56.7		
" .01	76.2		
<u>Medium</u>			
Kennebec (Maine)	378	83	16.8
Katahdin (Maine)	426	91	17.5
Kennebec (N.Y.)	395	75	16.8
Katahdin (U.S.D.A.)	404	91	18.4
Saco	256	67	17.5
Merrimack	431	88	19.8
Osage	142	78	16.1
Plymouth (B-73-10)	221	86	17.3
Teton	330	80	15.4
Kennebec (U.S.D.A.)	515	84	17.3
B 926-9	317	86	15.5
B 922-6	185	76	15.7
Boone (N.C. 880-4)	434	85	15.6
B-355-35	277	76	16.8
Pungo (U.S.D.A.)	363	89	17.5
B 2368-4	392	89	17.1
Keswick	306	85	19.3
L.S.D. .05	83.3		
" .01	111.1		

(continued)

Pa. table 1 continued

Variety	Average yield	U.S. No. 1	Dry matter
	U.S. No. 1 per acre		
	Bu.	Pct.	Pct.
<u>Late</u>			
Russet Rural	394	77	18.4
Canoga	255	69	17.1
Sebago (U.S.D.A.)	364	87	17.0
Sebago (Maine)	364	85	16.7
Canso	342	84	18.5
Red Pontiac	380	88	14.0
Rukat	398	80	17.5
Ontario	305	73	17.3
White Rural	439	77	18.5
L.S.D. .05	70.7		
" .01	96.1		

Among the early varieties Delus with 395 bushels of U.S. No. 1 was significantly higher in yield than any of the other varieties in this group and produced tubers with the highest dry-matter content. Among the medium varieties, Kennebec (U.S.D.A. seed source) produced the highest yield --515 bushels of U.S. No. 1 tubers per acre. However, when the least significant difference is taken into account, Boone and Merrimack could be considered in the same class. Merrimack and Keswick were the two highest with respect to dry-matter content.

Among the late varieties White Rural and Russet Rural ranked first and second in yield, and the tubers of both were relatively high in dry matter.

PENNSYLVANIA
Elmer Pifer and J. S. Cobb

Twelve varieties of potato were tested at 8 locations in Pennsylvania in 1955. Tests were made by the Extension Sections of Agronomy, Agricultural Economics, Entomology, and Plant Pathology, in cooperation with the agronomy staff of the Agricultural Experiment Station. The average yields and percentages of U.S. No. 1 potatoes and the average percentages of dry matter are given in Pa. table 2.

Pa. table 2. Yields and dry matter of potato varieties 1955 extension potato variety demonstrations. Average of 8 demonstrations: Clearfield, Erie, Lehigh (2), Schuylkill, Somerset, Sullivan and York Counties.

Variety	Average yield per acre		Dry matter
	U.S. #1 Bu.	Pct.	Pct.
Delus	237	69	18.7
Merrimack	301	69	17.7
Russet Rural	248	58.	17.7
Irish Cobbler	270	70	17.5
Osage	166	76	17.0
Kennebec	280	66	16.9
Canoga	278	61	16.9
Katahdin	319	72	16.7
Cherokee	258	68	16.7
Saco	291	58	16.5
Rukat	343	70	15.8
Red Pontiac	398	73	14.4

PENNSYLVANIA
W. R. Mills

In past years, all breeding and selection has been done at University Park, Pa., with advanced selections then tested for yield and adaptation in several of the more important potato counties. In 1954, the program was changed as follows: All seedlings are grown the first year at University Park, they are increased in Potter County (10 hills), and those selected in Potter County are planted in 25- to 50-hill lots in each of 3 locations: Potter County, Lehigh County, and University Park. In 1955, we grew about 500 10-hill lots in Potter, 125 25-hill lots in each of the locations, and 6,500 new seedlings at University Park. At each location, every third row was planted with Katahdin, so that each 25-hill selection was checked against an adjacent Katahdin. In the future, it is hoped to produce all seed in Potter County, where conditions for seed production are much superior to University Park. Despite tuber indexing, tuber-unit planting, and constant roguing, virus spread was so high during the disastrous years of 1952 and 1953 that the majority of selections 2 or more years old were lost.

Blight

Blight has not appeared on the University farm since 1951. We have refrained from field inoculation because we wish to determine which races appear naturally. However, all selections are tested in the greenhouse with all available races. It is obvious that single major genes for resistance, derived from Solanum demissum, or combinations of these genes, are insufficient for lasting resistance. Races have already been picked up in the United States and Canada which will blight potatoes carrying any of the major genes known to S. demissum.

Several years ago we observed that certain potato seedlings which were duplex for gene R_1 showed considerable resistance to race 1, whereas most selections which were simplex for R_1 were completely susceptible. Similar effect has been noted with gene R_2 .¹ This seems to indicate a quantitative as well as qualitative effect of the major genes and raises the question whether a selection duplex for 2 or more major genes would be more resistant than 1 duplex for a single gene. Many, perhaps most, clones of S. demissum are highly resistant in Mexico. It appears possible that the resistance is due to a combination of dosage of major genes, plus "minor" genes.

Since 1953, crosses have been made which were designed to concentrate major genes. A fairly large number of seedlings have been found which show a high degree of resistance in greenhouse inoculations. Genes R_1 , R_2 and R_4 are involved. Testing of 400 new seedlings with a very pathogenic race 1, 2, 4, obtained from M. E. Gallegly, W. Va., is nearly completed. None is immune, but several react only with non-spreading, necrotic flecks, while a total of 75 were rated "3" or less, on a scale of 0 to 5, 5 being

completely susceptible. A few of the resistant selections have been backcrossed to susceptibles. Progeny analysis is incomplete, but the present indication is that both major and minor genes are contributing to the resistance.

All seedlings showing resistance in these tests will be sent to J. S. Niederhauser, Mexico, to determine the reaction there. In addition, 4,000 new seedlings, unselected except that they have survived inoculation with races 1, 2, and 1, 4 will be tested by Dr. Niederhauser.

Chipping Quality

In cooperation with the research staff of Wise Potato Chip Company, all new selections retained at the 10-hill stage of selections are given a preliminary test for chipping quality. The following year (25-50 hill) those which showed promise in the preliminary test are given a more complete trial. In 1954, 32 of 65 varieties made satisfactory chips over a 5-week period. In 1955, due to a drought and heat wave of unprecedented severity, the plot in Lehigh County, from which chipping samples are taken, was largely ruined. Even so, early and midseason varieties chipped about as well as in 1954. All late varieties, including the quality standard, Russet Rural, made unsatisfactory chips.

RHODE ISLAND
J. E. Sheehan

During the 1955 growing season 1 seedling selection and 19 potato varieties were grown for comparison at the Rhode Island Agricultural Experiment Station. The plots selected for the test were seeded down with a ladino clover-bromegrass mixture during the previous 4 years. The soil is classified as Bridgehampton, very fine sandy loam. Granular calcium cyanamide at the rate of 200 pounds per acre was broadcast before planting. An 8-12-12-2 fertilizer at 2000 pounds per acre was applied in bands at planting time.

The past season was judged reasonably good for potato production. R. I. table 1 gives the average rainfall and temperatures throughout the 1955 growing season. Early season rainfall was below normal, whereas July, August, and September rainfall was above normal. Temperatures throughout the growing season were above normal generally, with July and August, respectively, 4.6 and 3.4°F higher than normal.

R. I. table 1. Rainfall and temperature for the 1955 growing season at Kingston, R. I. Rainfall in inches.

	April	May	June	July	Aug.	Sept.
	In.	In.	In.	In.	In.	In.
Normal	4.63	3.86	3.46	3.34	4.30	3.90
Actual	2.60	1.86	3.14	3.79	10.08	5.26
Departure	-2.03	-2.00	+0.32	+0.45	+ 5.78	+1.36
Temp. °F						
Normal	46.5	55.0	63.6	69.2	68.0	61.9
Actual	48.3	57.7	63.6	73.8	71.4	62.3
Departure	+1.8	+2.7	0	+4.6	+3.4	+0.4

Yields were calculated from 32-foot rows, replicated 4 times. Seed pieces were spaced 1 foot apart in the row except one set of Russet Burbank which were spaced 18 inches apart. The rows were spaced 3 feet apart. The potatoes were planted on April 20 and harvested on September 22.

A portion of the data obtained is given in table 2. Sequoia was the highest yielding variety, producing 804 bushels per acre. This variety significantly outyielded all others except Pontiac, Ontario, Saco, Teton and B 2368-4. While the overall yield was higher than last year the average total dry matter was considerably lower.

R. I. table 2. Yield and other data for 20 potato varieties grown at Kingston, R. I., 1955.

Variety	Yield per acre		Dry matter	Days to maturity	Size	Tuber	
	U.S. No. 1						Shape
	Bu.	Pct.	Pct.				
Sequoia	804	95.3	15.7	153	Large	Smooth	regular
Pontiac	767	95.4	14.6	139	Large	Medium	"
Ontario	735	91.3	16.9	153	Med. large	Smooth	"
Saco	690	95.5	16.4	139	Medium	Smooth	irregular
B 2368-4	681	96.9	16.7	139	Med. large	Medium	regular
Teton	681	95.2	15.2	153	Large	Smooth	regular
Menominee	639	96.5	17.8	152	Medium	Rough	irregular
Green Mountain	615	94.6	17.9	153	Medium	Medium	"
Sebago	592	97.0	15.0	153	Medium	Smooth	regular
Katahdin	561	97.2	15.8	135	Medium	"	"
Kennebec	548	96.0	15.3	145	Med. large	"	"
Chippewa	529	95.0	14.3	139	Med. large	"	"
Irish Cobbler	489	94.1	18.4	117	Medium	Rough	irregular
Mohawk	463	97.3	17.5	142	Medium	Smooth	regular
Warba	461	95.4	16.7	117	Medium	Medium	irregular
Keswick	454	97.2	16.8	120	Medium	Smooth	regular
Merrimack	422	96.2	17.5	139	Medium	Medium	regular
Delus	399	96.4	17.5	145	Medium	"	"
Russet Burbank	396	87.6	16.9	127	Medium	Rough	irregular
Cherokee	356	93.2	17.3	127	Medium	Smooth	regular
Russet Burbank*	319	87.0	16.7	127	Medium	Rough	irregular
L.S.D. at .05	162						

*Spaced 18", all other varieties spaced 12".

Irish Cobbler was the leading variety in total solids, followed by Green Mountain, Menominee, Mohawk, Merrimack, and Delus.

Disease and insect damage appeared to be rather minor throughout the season. The major portion of insect damage was caused by flea beetles followed by aphids. The flea beetle population at Kingston was only about half that in 1954. No early blight was detected on any variety, and only a slight infestation of late blight on the Green Mountain variety was noted late in the season.

The spray interval was determined by insect hatch-cycles and actual field population estimates, along with a blight forecasting system.

Chemicals used were 50% wettable DDT powder, Parzate and 40% Nicotine sulfate. The DDT was applied at the rate of 2 pounds per acre, Parzate at 2 quarts, and nicotine sulfate at 1 quart per acre. All chemicals were applied in 100 gallons of water per acre.

South Carolina
Wm. M. Epps

Objective: Comparison of new potato varieties for adaptation to South Carolina conditions.

Methods:

Planted: February 14. Seed cut February 1, except one lot of Sebago in each test.

Fertilizer: 1,640 lbs. 6-8-6 per acre, applied January 18.

Plot Plan: 4 replicates of single-row plots, 29 ft. long (test A) and 16 ft. long (test B) arranged in a randomized block.

Average Solids: From specific gravity determinations obtained by weighing 5 lbs. of potatoes from each replicate in water.

Harvested: June 7 (test A); June 8 (test B).

Internal Browning (due to dry season): Few large tubers cut in each variety.

Maturity: The vines of the early varieties were almost completely dead at harvest. The late varieties, such as Sebago, were yellowing with maturity. All early varieties appeared earlier than they did in 1954.

Seasonal Conditions:

The 1955 season was so wet early in February that planting was delayed. The soil was still wet at planting. The rest of the season was dry. Irrigation was applied as needed during the growing season. The stand was only fairly good, and a few missing hills existed in every plot. Diseases were not a problem. Blackleg, mosaic, and leaf roll were present in trace amounts. Late blight did not appear. Early blight caused some damage to the foliage of a few varieties, but this damage was to already mature foliage and the effect on yield was probably negligible. Nematode root knot was present in spots but caused little damage.

Some decay started in the early cut seed of Sebago and caused some damage as reflected in the difference between early cut and fresh-cut seed.

S. C. table 1. Yield, starch content, and varietal description of potato varieties tested at Charleston, S. C., 1955. (Test A)

Variety	Yield per acre	Starch	Shape	Skin color	Flesh color	Maturity	Eyes	Appear- ance
	Bu.	Pct.						
Sebago PEI ^{1/}	467	18.2	Oval	White	White	Late	Shallow	Very good
B 926-9	456	16.9	Oval	Russet	"	Early	Medium	Good
Sebago PEI	425	18.2	Oval	White	"	Late	Shallow	Very good
B 73-3 (S)	375	20.2	Long	"	"	M-early	Medium	Good
Merrimack	367	17.6	Oval	"	"	Late	"	"
B 605-10 (S)	356	19.6	Round	"	"	Early	"	"
Cobbler	346	19.0	"	"	"	Early	Deep	Fair
Delus (S)	335	19.4	Oval	"	"	M-season	Shallow	Very good
Bliss	333	17.6	Round	Red	"	Early	Deep	Fair
Sebago NY	287	16.9	Oval	White	"	Late	Shallow	Very good
B 922-6	158	20.1	Oval	"	"	Early	"	" "
LSD 19:1	79	0.7						
99:1	106	1.0						

^{1/} Seed was cut immediately before planting. All other seed was cut 14 days before planting.

Internal Browning: Only Sebago and B 922-6 showed internal browning. Sebago showed 47% of large tubers discolored and B 922-6 showed 40%. Cobbler showed only a trace of discoloration. No tubers of the other varieties showed any trace. The three lots of Sebago were apparently equally affected. The discoloration was mostly restricted to the seed end of the tuber.

Conclusions:

Test A

The early and mid-early B 73-3 and B 605-10 looked very good. The yield and starch content of these potatoes were at least equal to or slightly better than Irish Cobbler, and the tuber appearance of both was vastly superior to Cobbler. B 926-9 produced a high yield, but the tubers were lightly russeted and the starch content was very low. Merrimack produced a good yield of attractive potatoes, but it was as late as Sebago and the starch content was low. Delus was comparable with Cobbler in yield and starch content but was later than Cobbler. Its appearance was very good. B 922-6 produced very attractive tubers with high starch content, but the vines were weak, the yield was low, and a high percentage of the tubers showed internal discoloration.

The poor performance of the N. Y. Sebago sample was possibly due to cold damage to the seed in transit. There were frozen tubers in the bag upon arrival. There was no obvious reason for the low starch content.

S. C. table 2. Yield, starch content, and varietal description of potato varieties tested at Charleston, S. C., 1955. (Test B).

Variety	Yield per acre	Starch	Shape	Skin color	Flesh color	Maturity	Eyes	Appearance
	Bu.	Pct.						
3769 (S) 1/	424	16.6	Oval	White	White	M	Shallow	Very good
Sebago PEI	323	17.6	"	"	"	L	"	" "
4454 (S)	289	17.4	Long	"	"	M	"	Good
4112 (S)	278	17.4	Oval	"	"	E	Medium	"
3674 (S)	244	16.1	"	"	"	VE	Medium	"
4429	244	17.3	"	Russet	"	E	Shallow	Fair
4420 (S)	221	17.6	"	Sl. Russet	"	E	"	"
3633	218	18.7	"	White	"	ME	"	"
4426 (S)	218	18.2	"	"	"	E	"	Good
1859	214	18.4	"	Red	"	E	Medium	Fair
Osage (S)	206	18.8	Long	White	"	E	"	Very good
Sebago NY 2/	199	17.7	Oval	"	"	L	Shallow	" "
Sebago PEI	195	17.6	"	"	"	L	"	" "
3954	191	15.5	"	"	Yellow	VE	Shallow	Fair
4101	158	18.2	"	"	White	VE	Medium	Fair
3266	128	16.3	"	"	"	VE	Shallow	Good
3953	128	16.5	"	"	Yellow	E	"	Very good
3962	113	15.6	Round	S. Russet	White	VE	"	Good
L.S.D. 5%	108	.94						
1%	143	1.26						
50.4-53-40	-	17.0	Round	Red	White	ME	Medium	Good
Redkote	-	16.5	"	"	"	ME	"	Poor

1/ Freshly cut seed planted.

2/ Seed cut 14 days before planting.

Conclusions:

Test B

None of the potatoes in test B appeared to be ideal, but several appeared promising as follows:

3769 produced an excellent yield of attractive tubers and was considerably earlier than Sebago, but its starch content was only 16.6% about 1% lower than Sebago.

4454 produced a good yield of attractive tubers and was also earlier than Sebago. Its starch content was only equal to Sebago and it produced a large number of small size A and size B potatoes rather than the few large potatoes produced by Sebago. Such potatoes, without irrigation, might produce mostly size B's.

4412 produced a good yield and it was early. The tubers were large, but not as smooth and attractive as Sebago, and the starch content was no higher than that of Sebago.

3674 produced a good yield with low starch content for the second consecutive year (16.6% in 1954). It was very early and the tubers were smooth and attractive.

4420 produced a fairly good early yield, but its appearance was only fair and its starch content was no higher than that of Sebago.

4426 was good or fairly good in yield, appearance, and starch content.

Osage produced a fairly good yield, with highest starch content of any variety in the test (18.8%). The tubers were long oval and very attractive.

The other potatoes were discarded either because of low yield, poor appearance, yellow flesh, or a combination of these characters. All varieties appeared earlier than they did in 1954.

TENNESSEE (Crossville)
T. R. Gilmore

In 1955 nine seedlings and three named varieties, obtained from the southern project of the National Potato-Breeding Program, and originally increased at Crossville, were planted in a yield plot. Seedlings 3769 and 4454 continued to look good as they did in 1954; seedling 3600 also looked quite promising except that a high percentage of the tubers failed to make U.S. No. 1.

Tennessee table 1. 1955 potato yield test, Crossville, Tenn., 3 replications of 25 hills.

Variety or seedling	Parentage	Yield per acre	
		U.S. No. 1	U.S. No. 2
		Bu.	Bu.
Kennebec		391	60
3769	Kennebec x B 522-33	322	64
4064	B 607-37 x B 607-56	310	87
4454	B 446-54 x Teton	304	114
Pungo		287	36
3600	B 608-56 x B 594-46	267	148
Cherokee		251	75
4420	B 607-72 x B 598-29	249	38
1404	176-26 x 179-26	216	81
4720	B 607-56 x B 355-24	206	82
4021	B 381-2 x B 56-1	181	97
3962	B 76-23 x B 445-41	78	63

L.S.D. at 5% level 92.4

TEXAS (Weslaco)
Paul W. Leeper

Irish Potato Variety and Breeding Line Evaluation Tests

Variety Testing: Fall 1954

Tests were grown during two seasons, spring and fall. During the fall season 9 commercial varieties and 15 advanced breeding lines were grown in a replicated yield trial. Advanced breeding line material for these trials was furnished by the Nebraska Agricultural Experiment Station and by the U.S.D.A. during the spring of 1954, and seed was saved from the spring planting for fall trials. Red Pontiac and La Soda were outstanding red varieties in the fall trials. As shown in Texas table 1, Kennebec was the most productive white variety.

Spacing Test - Fall 1954

Data presented in Texas table 1 indicate a spacing of 9 inches between seed pieces is best for the production of large potatoes. A 6-inch spacing gave no increase in yield of large potatoes but increased the yield of B-size potatoes.

Variety Trials - Spring 1955

Some 64 varieties and advanced breeding lines were grown in 3 replicated yield trials. Seed potatoes of these varieties were collected during 1954 from breeders at several locations by the U.S.D.A. They were grown at one location in North Dakota so that all varieties being tested for yield at Weslaco had a common source.

Data presented in Texas tables 2, 3, and 4 show the varieties Red LaSoda, La Soda, and Red Pontiac to be most productive. Red La Soda is a red mutation from La Soda. It is now being increased by commercial seed growers for commercial production.

Yields were generally low this spring due to unfavorable weather conditions. The potatoes were frozen to the ground on February 11. Extremely high winds during the latter part of February, all of March, and early April caused heavy damage to the plants. Temperatures varied considerably from too cold to extremely hot.

Source of Seed Potato Test - Spring 1955

As shown in Texas table 5 source of seed potatoes is an important factor in producing high yields.

Commercial Variety Trials - Spring 1955

Seven varieties were included in this trial. Seed potatoes for this test came from commercial seed producers in Nebraska except 1859 which came from Tennessee. Results of this test are shown in Texas table 6.

Observational Trials - Spring 1955

Thirty-two breeding lines received from the increase plot in North Dakota were grown. Yields and remarks are given in Texas table 7.

Breeding Plots

Some 195 breeding lines were included in these plots. Individual hill selections were made from some 50 of these lines. Material for these trials came from the Nebraska Agricultural Experiment Station through a cooperative agreement between the two stations. From this material it should be possible to select lines which combine good yields of very attractive dark red tubers. Resistance to one or more diseases is also carried in a number of these lines.

Texas

Table 1. Yields per acre by varieties and market grades and sizes, fall test, 1954.

Variety	Yield per acre U. S. No. 1				
	Size 1 7/8" & over	Size 1 1/2" to 1 7/8"	Total marketable	Culls	Total yield
	Bu.	Bu.	Bu.	Bu.	Bu.
1 1354	105	24	128	8	136
2 3546	141	43	184	29	205
3 Sheridan	68	18	86	8	94
4 1404	65	19	84	8	92
5 4458	160	21	181	11	192
6 26.44-1	123	33	156	20	176
7 4145	131	14	145	3	148
8 Bliss Triumph	132	29	162	16	178
9 20.44-2H	137	22	159	6	165
10 4411	66	24	89	9	98
11 White Rose	85	86	171	24	195
12 Desota	143	26	170	11	180
13 127.46-1	133	16	150	7	156
14 20.44-2 1/	133	40	173	14	187
15 Red Pontiac	223	19	242	7	249
16 Redglo	167	24	191	14	205
17 Red Warba	168	32	200	15	215
18 La Soda	197	17	214	9	223
19 1396	141	39	180	11	191
20 4422	103	57	161	24	185
21 Kennebec	199	15	214	6	219
22 4399	58	33	91	18	109
23 1859 SD	186	20	205	6	212
24 3655	63	25	88	10	98
25 189.45-6	35	35	69	22	91
L.S.D. .05	6.4	2.3	6.6	1.3	6.6
" .01	8.5	3.1	8.9	1.7	8.7

(table continued)

Table 1 continued

Variety	Yield per acre U. S. No. 1				
	Size 1 7/8" & over	Size 1 1/2 to 1 7/8"	Total marketable	Culls	Total yield
Yield by Market Grades and Sizes, Spacing Test ^{2/}					
30 12-inch spacing	100	43	143	18	161
40 9 " "	130	49	178	21	200
60 6 " "	128	64	192	28	220
120 3 " "	123	72	195	58	253
L.S.D. .05	8.0	2.9	9.9	2.2	9.1
" .01	11.6	4.2	14.2	3.2	13.0

1/ 20.44-2 seed potatoes grown at Weslaco, Tex.
20.44-2H " " " " Hereford, "

2/ Seedling line 20.44-2 developed by Dr. H. O. Werner was used in this test
Test planted October 18, 1954; harvested January 20, 1955.

Table 2. Yields in bushels per acre by market grades and sizes. Early maturing potato variety test, Weslaco, Tex., Spring 1955

Variety	U. S. No. 1 grade					Remarks
	Size 1 7/8" & over	Size 1 1/2 to 1 7/8"	Total marketable	Culls	Total yield	
	Bu.	Bu.	Bu.	Bu.	Bu.	
2774-3R	28	17	46	10	55	Dark red, smooth. Repeat
20.44-2	48	37	85	24	109	" " light russet "
I803-3	64	26	90	13	104	Discard
457-1-16E	59	10	69	5	73	"
457-1-10E	115	13	128	8	137	White, smooth. Repeat
4735	93	18	111	6	117	" " "
4379	62	23	85	7	92	Pink, medium rough. Discard
1393	30	22	52	9	61	Pink, smooth. Discard.
Early Gem	66	11	77	8	84	White, russet, med. rough. Discard.
2906-IRE	71	14	86	8	93	Red, smooth. Discard
L.S.D. .05	4.1	1.7	2.2	1.0	3.8	
.01	5.5	2.3	2.9	1.3	5.0	

Early variety potato test. One-row plots, 25 ft. long, 25 seed pieces/plot, 5 replications. Planted January 6, 1955, harvested April 18, 1955.

Texas table 3. Yields in bushels per acre by market grades and sizes. Medium maturity potato yield trials, Weslaco, Tex., spring 1955.

Variety	Yield per acre					Remarks
	Size 1 7/8" & over	Size " 1 1/2 to 1 7/8"	Total market-able	Culls	Total	
	Bu.	Bu.	Bu.	Bu.	Bu.	
2555-6R	51	33	84	12	96	Dark red, smooth. Repeat
Redglo	85	30	115	14	128	Dark red, rough. Discard
Cherokee	134	25	159	9	168	White, smooth. Repeat
1354	132	28	160	10	171	Pink, medium, rough. Repeat
92-23	53	19	72	11	82	Red, smooth. Repeat
2910-1R	58	19	77	12	89	Dark red, smooth. Repeat
Dazoc	69	13	81	4	85	Red, rough. Repeat
2728-20R	42	26	72	16	88	Dark red, medium rough. Discard
4422	54	30	84	19	102	Pink, rough. Discard
3953	87	9	96	5	101	White, cracks, med. rough. Repeat.
3309-8	117	30	146	9	155	Red, medium rough. Repeat
3655	55	33	88	17	105	Discard
82-269	112	22	134	9	143	Light pink. Repeat
3976	5	11	16	9	24	Pink. Discard
2555-12R	51	21	72	8	80	Dark red. Discard
3022-18M	105	9	114	3	117	White, smooth. Repeat
3203-6RM	72	38	110	19	129	Red, smooth. Repeat
1859	131	13	144	7	151	Light red, rough. Repeat
2124-2R	47	8	55	4	58	Dark red. Repeat
2799-5R	71	26	97	11	108	Dark red, smooth. Repeat
Red Pontiac	145	20	165	9	173	Red, medium rough. Repeat
457-1-35	87	17	105	6	110	White, smooth. Repeat
L.S.D. .05	4.6	1.4	4.9	1.0	4.7	
" .01	6.1	1.9	6.5	1.3	6.3	

Medium maturity potato yield trial
 One-row plots 25 ft. long
 25 seed pieces per plot
 Five replications
 Planted January 6, 1955
 Harvested April 18, 1955

Texas table 4. Yield in bushels per acre by market grades and sizes. Late maturing potato variety trials, Weslaco, Texas, spring 1955

Variety	Yield per acre					Remarks
	Size 1 7/8" and over	Size 1 1/2 to 1 7/8"	Total market-able	Culls	Total yield	
	Bu.	Bu.	Bu.	Bu.	Bu.	
2874-4	50	21	71	6	77	Pink, medium rough. Discard.
4166	27	29	56	25	81	Dark, red, smooth. "
Red LaSoda	201	12	214	6	220	Red, medium, rough. Repeat
Kennebec	103	12	115	5	120	White, medium, rough. "
2231-2L	120	33	154	14	167	White, smooth. "
204.43-1	84	12	96	4	100	Red, rough. "
92-167	66	42	108	15	124	Pink, medium rough. Discard
Red Kota	128	14	142	5	147	Red, smooth. Repeat
1396	100	40	140	13	153	Red, smooth. Discard
Sheridan	53	20	73	9	81	Red, medium, rough. "
De Sota	121	27	148	8	156	Pink, medium rough. "
457-1-36L	100	12	112	4	116	White, smooth. Repeat
A114-4	51	36	86	23	109	Russet pink, Discard
217.43-3	60	22	81	14	95	Dark red, rough
Bliss Triumph	112	20	132	8	140	Pink, medium rough. Repeat
LaSoda	162	15	176	6	182	Light pink, med. rough "
I9100-3L	127	13	140	5	145	White, smooth "
4817	100	28	128	13	141	Red, smooth. "
4814	120	22	141	11	153	Light pink, smooth. "
4908	25	34	59	22	80	Pink, smooth. Discard
2368-4	107	27	134	8	142	Pink, rough. Repeat
2569-4R	68	26	94	8	102	Dark red, smooth. "
12623	135	28	163	10	173	Dark red, rough Discard
3546	49	38	87	15	102	Pink, smooth. "
73.37-4	9	30	39	17	56	Red, rough. "
26.44-2	42	15	58	6	63	Red, smooth. "
4893	68	41	108	29	137	Red, rough "
189.45-6	61	19	79	7	86	Pink, rough, "
B 3309-6	57	44	101	29	130	Pink, medium rough. "
7724	108	17	125	7	132	Light pink, smooth. "
2124-2OR	83	28	110	17	127	Dark red, smooth. "
20.42-1	95	35	130	10	139	Dard red, rough. "
L.S.D. .05	4.1	1.7	4.0	.9	4.1	
" .01	5.4	2.2	5.3	1.2	5.4	

Late maturing potato variety yield trials
 One-row plots 25 feet long
 25 seed pieces per plot
 5 replications
 Planted January 6, 1955
 Harvested April 19, 1955

Texas table 5. Yield in bushels per acre by market grades and sizes. Source of seed potatoes test. Weslaco, Tex., spring 1955.

Variety	Source of seed	Yield per acre U.S. No. 1 grade				
		Size 1 7/8" & over	Size 1 1/2 to 1 7/8"	Total market- able	Culls	Total
		Bu.	Bu.	Bu.	Bu.	Bu.
Bliss Triumph	Tennessee	8	6	14	5	19
" "	North Dakota	50	19	70	7	77
" "	Colorado, elevation 5,100	70	25	95	9	103
" "	" " 7,200	90	19	109	5	114
" "	Nebraska Certified Potato Growers	93	19	112	8	120
La Soda	Tennessee	63	16	80	6	86
" "	Colorado, elevation 5,100	78	15	92	4	97
" "	Colorado	90	19	109	5	114
" "	North Dakota	122	10	133	4	136
" "	Nebraska Certified Potato Growers	127	16	143	5	148
L.S.D. .05		5.9	1.2	5.7	.7	5.6
" .01		8.0	1.6	7.7	1.0	7.6

Texas table 6. Yield in bushels per acre by market grades and sizes. Commercial Potato variety yield trials, Weslaco, Tex., spring 1955.

Variety	Yield per acre U.S. No. 1 grade yield per acre				
	Size 1 7/8" & over	Size 1 1/2 to 1 7/8"	Total marketable	Culls	Total yield
	Bu.	Bu.	Bu.	Bu.	Bu.
Bliss Triumph	122	25	147	8	155
La Soda	175	10	184	3	188
Sheridan	64	19	83	6	89
Dazoc	102	17	119	6	125
Redglo	102	27	130	10	140
1859	119	14	133	4	137
Red Pontiac	128	14	142	5	147
L.S.D. .05	3.8	1.0	4.0	.3	4.1
" .01	5.1	1.4	5.4	.5	5.5

Commercial potato variety yield test. Four-row plots 25 ft. long, 120 seed pieces per plot, 6 replications. Planted January 6, 1955, harvested April 20, 1955.

Table 7. Yield in pounds per plot from variable number of hills by market grades and sizes. Observational potato variety test, Weslaco, Tex. Spring 1955.

Variety	Yield per plot						Remarks
	Size 1 7/8" & over	Size 1 1/2 to 1 7/8"	Culls	Total yield	Hills per hill	Ave. per hill	
	Lb.	Lb.	Lb.	Lb.	No.	Lb.	
B 2340-2	15	3	3	22	63	.35	Pink, rough, late. Discard
3769	29	2	1	32	36	.88	4 reds, feathering, late. Discard
117.43-3	7	4	2	13	37	.35	Dark red, smooth, small. "
4399	10	7	5	21	63	.34	Pink, rough, small. "
A 153-12	6	5	2	13	45	.28	Light pink. "
4753	12	8	3	24	46	.52	Pink, med. rough, med. late. Repeat
4811	9	6	3	18	43	.43	Pink, smooth, late. "
4808	22	4	2	28	44	.64	Pink, rough, late. Discard.
209.43-1	15	5	2	22	34	.64	Dark red, rough, scab, late. "
2200-1R	33	10	5	48	60	.80	Dark red, rough, late. Repeat
3972	24	4	1	29	42	.70	Pink, rough, late. "
A114-3	8	7	5	20	40	.51	Russet pink, smooth, late. Discard
2396	13	4	1	18	34	.53	White, smooth, med. late. "
4145	4	3	1	8	25	.30	Red, rough, late. "
4101	9	8	3	19	38	.51	White, med. rough, late. Repeat.
A 153-15	23	5	2	30	49	.61	Pink, medium, rough, late. "
4411	11	5	3	19	39	.48	Pink, fairly smooth, med. late. Discard.
25.42-2	17	11	6	33	48	.70	Red, rough, late, scab. Discard
4458	10	4	1	15	34	.44	Pink, rough, scab, late. "
225.43-1	12	7	2	21	35	.60	Dark red, rough, scab, late. "
38.42-3	18	7	4	28	33	.85	Dark red, med. rough. Repeat.
4166	2	4	10	16	61	.26	Dark red, smooth, late. Discard
311.43-1	12	4	2	18	26	.67	Dark red, rough, late. "
82-94	28	4	2	34	48	.71	Pink, medium rough, late. Repeat
2774-3R	15	5	2	22	54	.40	Dark red, smooth, med. late. "
B 2878-5	7	5	2	13	46	.29	Discard
126.21	14	3	1	18	27	.65	Pink, rough, scab. Discard
4729	9	11	5	25	49	.50	Lt. pink, medium late. "
B 2876-12	6	4	3	13	48	.27	Pink, medium late. "
91.47-1	12	7	3	21	30	.70	Pink, rough, med. late. "
1699	10	7	4	20	65	.31	Pink, rough, late. "
B 73-10	9	2	1	12	41	.29	White, good scab & bl. res. Repeat

Observation potato variety test
Variable plot size
Variable No. of hills per plot
Planted January 6, 1955
Harvested April 18-19, 1955.

UTAH
DeVere R. McAllister

The potato-variety trial for 1955 was located on the Greenville Experimental Farm, North Logan. The varieties were planted in 5 randomized blocks, in 3-row plots, 30 feet long and 3 feet apart, with 3-foot alleys between ends of plots. The plants were spaced 9 inches apart in the rows. The plots were planted May 20 on land that produced a crop of barley the preceding year. The plots were fertilized at the rate of 100 pounds of nitrogen per acre (300 lbs. ammonium nitrate). Plots were irrigated at weekly intervals until September 8 and were harvested October 18. Considerable numbers of green-end tubers resulted in severe culling of Kennebec and White Rose. Ring rot was found in Redkote.

Utah table 1. 1955 potato variety test, Logan, Utah.

Variety	Total yield per A.	Market- able	Yield marketable over 1 7/8"	Comments
	Bu.	Pct.	Bu.	
1. DeSoto	558	88.8	496	
2. Pontiac	576	82.0	472	
3. Sheridan	513	86.0	441	Smooth
4. Katahdin	524	82.6	433	Green ends
5. Redkote	496	82.8	411	Ring rot
6. Red Bliss Triumph	515	70.3	362	Cracked badly
7. Early Gem	569	60.3	343	Oversize & poor shape
8. Ontario	426	77.7	331	Green ends
9. Redburt	490	64.9	318	
10. Kennebec	509	52.7	268	Green ends
11. Russet Burbank	417	62.1	259	Poor shapes & small.
12. White Rose	376	49.7	187	Green ends
	X	=	360	
	F.	=	12.54**	
	L.S.D.	.05	10.4 bu.	
	"	.01	13.9	
	C.V.	=	16.48%	

VIRGINIA (Blacksburg)
P. H. Massey, Jr.

Sixteen potato varieties were grown and evaluated at Blacksburg in 1955. The experimental procedure and growing conditions were as follows:

Location:	Blacksburg, Virginia
Soil:	Groseclose silt loam.
Previous crop:	Squash followed by wheat and oat cover crop.
Plot size:	30 x 3 feet (data taken on center 28 feet of each record row).
Plot design:	Randomized block.
Replications:	Four
Seed:	Supplied by U.S.D.A., Triumph and Redburt.
Spacing:	Twelve inches.
Fertilization:	1500 lbs. per acre of 5-10-5. One-half broadcast and harrowed into soil and the remainder applied in bands at time of planting.
Planting date:	April 1.
Cultivation:	Frequently enough to control weeds.
Insecticides:	DDT and Malathion.
Growing conditions:	Generally favorable.
Harvest date:	September 9.

The Triumph and Redburt varieties were removed from the trial on June 25 because of a high incidence of virus infection.

The environmental conditions during the growing period were much more favorable than in the previous three years. More adequate rainfall resulted in higher yields of all varieties and seedlings.

The Merrimack variety yielded significantly more U. S. No. 1 potatoes than any other variety tested except Sequoia. The Merrimack and Delus varieties were significantly higher in specific gravity than the other lines included in this trial. Kennebec performed quite satisfactorily and is still one of the best varieties for this area.

Virginia table 1. Yield per acre, specific gravity and dry matter of 14 varieties of potatoes tested in 1955.

Variety or seedling	Mean yield per acre			Mean ^{1/} specific gravity	Total solids
	U.S. No. 1	U.S. No. 2	Total		
	Bu.	Bu.	Bu.		Pct.
Merrimack	391 ^a ^{2/}	31 ^a	468 ^a	1.087 ^a	21.2
Sequoia	350 ^{ab}	32 ^a	451 ^a	1.071 ^f	17.7
Pontiac	313 ^{bc}	26 ^b	366 ^b	1.070 ^f	18.6
Kennebec	303 ^{bc}	16 ^c	352 ^b	1.082 ^{bc}	20.2
Saco	270 ^{cd}	32 ^a	371 ^b	1.070 ^f	17.4
Delus	228 ^{de}	6 ^e	252 ^{cd}	1.087 ^a	21.2
Pungo	221 ^{de}	19 ^c	273 ^c	1.079 ^{de}	19.4
B 926-9	204 ^e	18 ^c	246 ^{cde}	1.071 ^f	17.6
Cherokee	195 ^e	15 ^c	234 ^{cde}	1.080 ^{bcd}	19.7
B 73-10	188 ^e	10 ^d	213 ^{def}	1.072 ^f	17.9
Katahdin	176 ^{ef}	18 ^c	212 ^{def}	1.070 ^f	17.5
Irish Cobbler	134 ^{fg}	26 ^b	189 ^{ef}	1.078 ^e	19.2
B 605-10	133 ^{fg}	11 ^d	158 ^f	1.082 ^{bcd}	20.0
Early Gem	109 ^g	16 ^c	155 ^f	1.069 ^f	17.4

^{1/} Specific gravity determinations made on 4 replications of 25 tubers each.

^{2/} The superscripts (a, b, and c) indicate the statistical significance of the yield figures at the 5% level. For example, in each column, data bearing an "a" subscript are significantly different from those not having an "a"; "b" significantly different from those not having a "b", etc.

Virginia (Norfolk)
T. J. Nugent and M. M. Parker

Eleven varieties of Irish potatoes were planted at Onley, Va., in the same plot that had been used the previous 2 years. The soil was well infested with the scab organism. Prior to planting, the soil was treated with an insecticide to prevent tuber injury from flea beetle larvae. Four replicates (40 seedpieces per replicate) were planted March 11 and the potatoes were harvested June 30. Approximately 50 potatoes from each replicate were graded for scab and a scab index (0 = no scab; 100 = all potatoes severely scabbed) was determined.

Results

With the exception of Irish Cobbler, there was less scab than recorded in 1954. Cherokee had practically no scab. Pungo showed much less scab than in previous years and was nearly equal to Cherokee. Osage also showed high resistance. There was no significant differences between these three varieties.

Table 1. Scab index and total and marketable yields of A-size potatoes.

Variety	Scab index	Yield per acre	
		Total 100-lb. bags	Marketable 100-lb. bags
Cherokee	2.0	183	183
Pungo	3.6	202	202
Osage	3.8	163	161
Sebago	16.6	282	272
Canso	24.0	188	158
Pontiac	27.6	246	210
Katahdin	30.6	262	189
White Cloud	38.2	139	82
Chippewa	39.2	194	121
Kennebec	41.4	334	187
I. Cobbler	59.0	138	40
L.S.D. at 5%	10.0	28	53

1955 Irish Potato Variety Tests with and Without Irrigation Norfolk, Va.

Eleven varieties were planted in 2 blocks separated from each other by 12 buffer rows. One block was irrigated several times during the season and the second block was left unirrigated.

Plot rows were 40 seedpieces long, and each plot was replicated 4 times. The fertilizer treatment for the planting consisted of applying 3,000

pounds of a 5-10-5 mixture per acre. One-third of the amount was broadcast and plowed under; the remainder was placed in bands in the row. The seed was planted by hand at a spacing of 12 inches in the row, and the rows $3\frac{1}{2}$ feet apart.

Results

Because of the rather dry season, irrigation was very effective in increasing the yield of the varieties in the test. In the case of some of them, the increases were more than 100 percent. The average increase in yield for all of the irrigated varieties, however, was approximately 87%.

Comparative low yields were obtained from some of the varieties in the non-irrigated plots. Chippewa, Cobbler, Cherokee, White Cloud, Canso, and Osage produced considerably less than the other varieties, which might indicate that they are not adaptable to dry soil conditions. The data for these tests are given in Va. table 2.

Va. table 2. Irish potato variety tests at Norfolk with and without irrigation

Variety	Yield A size per acre	
	Irrigated	Not irrigated
	100-lb. sacks	100-lb. sacks
Pontiac	292	155
Kennebec	249	152
Sebago	236	140
Chippewa	236	93
I. Cobbler	233	96
Cherokee	227	106
Katahdin	221	134
White Cloud	215	106
Pungo	214	131
Canso	190	84
Osage	81	81
Average	217	116

1955 Irish Potato Variety Tests Spring Crop, Grown Without Irrigation Onley, Va.

Eleven varieties of potatoes were planted the second week of March at each of two locations on the Experiment Station Farm. Both plantings were in the same type of soil, within a few hundred feet of each other, but the soil in one of the places held moisture better than the other, and consequently was more productive in a dry season.

Forty seedpieces were planted in each plot row with four replications of each plot. Just before planting, a 5-10-5 fertilizer mixture was applied

in bands in the row at the rate of 2,000 pounds per acre. The seedpieces were planted by hand at a spacing of about 14 inches between the seed and 3 feet between rows.

Because of a lack of rainfall at a critical point in the "sizing up" stage of the tubers, the growing season was unfavorable for large yields from the early maturing varieties, but was very favorable for the late kinds which received good rainfall late in their growth. The varieties were harvested at two intervals: once when the early and second early kinds were mature, and again later when the late maturing ones were ready.

Results

Va. table 3 gives the yield of A-size potatoes in 100 pound sacks per acre for each of the 2 locations, and also the average yield for both places. With one exception, all of the varieties gave better yields at 1 of the locations than they did at the second place. Also, within each planting the late-maturing kinds gave larger yields than the early ones.

Kennebec produced the largest average yield. It was followed by Sebago and Katahdin. The individual tubers from both Kennebec and Sebago, however, were very large in size. Those of the Katahdin and the other varieties were only about one-half to three-quarters as large.

Irish Cobbler, White Cloud, and Osage gave comparatively low yields - accountable for by lack of rainfall at the proper time. Another factor which may have contributed to the low yield from Osage, however, was the poor stand of plants obtained from the seed. In addition to the low yield, though, the Osage did not produce the long type of potato expected from it. Only a very small percentage of its tubers were long. Most of them were round.

Va. table 3. Variety tests at Onley, Va., 1955.

Variety	Yield A size per acre		
	Location 1	Location 2	Average
	100-lb. sacks	100-lb. sacks	100-lb. sacks
Kennebec	333	264	298
Sebago	282	199	240
Katahdin	262	196	240
Pontiac	246	199	222
Chippewa	194	180	187
Pungo	202	149	175
Cherokee	183	168	175
Canso	188	146	167
I. Cobbler	138	140	139
White Cloud	139	131	135
Osage	163	87	125

WASHINGTON (Mount Vernon)
Martin W. Carstens

The potato variety testing program was limited to northwestern Washington in 1955. Growers maintain a strong interest in the variety testing and breeding program because of the importance of the area as a certified seed producing area, and also because of the demand for varieties for special use. In the main commercial potato-producing area of central Washington, leaf roll, scab, and verticillium wilt still remain a major problem. In western Washington late blight, verticillium wilt, rhizoctonia, and certain viruses are of principal importance.

Russet Burbank (Netted Gem) and White Rose remain as the two leading commercial varieties. Some acreage of Red Pontiac, Kennebec, Katahdin, Early Rose, Bliss Triumph, and Early Gem are grown for certified seed production.

The climate for 1955 was favorable for high yields. Most plantings were delayed in planting due to cold, wet weather. August and September were abnormally dry and warm causing excellent vine growth and good size to tubers. Approximately 25% of the crop was caught in the early November freeze with a total loss of that portion.

Eighteen varieties were included in the 1955 yield trials. These are shown in Carstens table 1. Several of the recent introductions performed well; only Saco, however, exceeded White Rose in yield. Saco, in addition to high yield, was among the highest for dry-matter content. Whereas the greatest commercial demand has been for the long whites, a number of growers are interested in demands from chip manufacturers for special varieties.

Carstens table 2 shows the relative yield per plant and dry-matter content of 76 U.S.D.A. selections. Because of the limited number of tubers available, observational trials only were included in 1955. Disease resistance studies will be conducted in 1956 with the increase in stock obtained this year. Yield figures in table 2 are given only on comparative basis and to give some basis for potential in yield. The high dry-matter content of certain selections is worthy of note.

Carstens table 1. Yield test, Mount Vernon, Wash., 1955.

Variety	Tuber color	Stand	T/A	No. l/A	Total solids	Hort. Characters
		Pct.		Tons		
Saco	White	98	29.7	27.7	23.0	Oval flat, uniform, sh. eyes, smooth.
White Rose	"	96	27.5	26.3	19.9	Long white, flat.
Cherokee	"	96	25.3	22.1	21.0	Med. size, uniform oval flat, sh. eyes.
Sheridan	Red	99	24.9	21.2	21.0	Tubers small round, flat, eyes deep-poor type for area.
Dazoc	"	99	24.8	21.1	21.0	Med. size, round, eyes medium depth.
Pungo	White	99	23.9	22.1	22.0	Med. " round to oval flat, rough, poor color.

(continued)

Carstens table 1 continued

Variety	Tuber color	Stand	T/A	No. l/A	Total solids	Hort. characters
		Pct.		Tons		
Redkote	Red	94	22.9	20.2	22.0	Large tubers, shallow eyes, blocky - superior to Pontiac in type.
Delus	White	100	22.7	22.4	22.0	Round, oval, flattened, smooth, shallow eyes, uniform size.
Keswick	White	96	22.6	21.41	23.0	Round to oval flat, very smooth, uniform.
Canso	"	99	22.5	21.2	21.0	Round, eyes med. depth, smooth skin, variable size.
Katahdin	"	98	22.4	20.6	21.0	Round to oval, somewhat flattened, smooth.
Gems	"	96	21.7	18.8	23.0	
Progress	Red	97	21.5	17.0	21.0	Round, eyes deep, tubers small.
Merrimack	White	98	19.3	17.4	21.0	Round to long oval, flattened.
Osage	"	94	18.8	17.1	23.0	Oblong blocky, uniform, shallow eyes.
Wh. Cloud	"	95	18.2	16.1	21.0	Mostly round, variable type, rough.
579-3	"	98	18.2	17.3	22.0	Oblong smooth, eyes shallow, res. to leaf roll.
137-5	"	85	17.8	17.0	17.7	Long smooth cylindrical, shallow eyes, few tubers per plant. High % #1.

Plot size 3' x 25'
Replications 4

Fertilizer 1,000 lbs. 6-20-20
Plants 1 foot apart in row

Carstens table 2. U.S.D.A. selections showing relative yields per hill and dry-matter content, 1955.

Pedigree No.	Parentage	No. plants	Yield per plant	Dry matter	Notes
			Lb.		
B 355-24	(X96-56) x Saranac	10	2.4	19.9	Res. to virus A, late blight & ring rot.
B 922-8	TI5 x B 355-24	10	2.5	22.0	" " late blight & ring rot.
B 2879-4	B 381-2 x B 874-15	9	3.3	22.0	" " scab & vert. wilt.
B2896-10	Kennebec x B 445-41	7	2.0	22.0	" " virus A, late blight & ring rot.
B1268-26	Katahdin selfed	6	2.8	23.0	" " vert. wilt.
B3140-36	B 607-72 x B 962-32	7	2.3	21.0	" " late blight & scab.
B3262-1	Ac25830 x B 922-3	7	1.4	21.0	" " Virus Y & l. blight.
B3401-20	B 922-3 x Menominee	9	2.4	18.8	" " l. blight, scab & vert. wilt.
B3401-25	B 922-3 x Menominee	10	3.1	19.9	" " l. blight & scab.
B 3405-1	B 779-1 x B 922-3	7	1.7	18.8	" " l. blight & immune from virus X.
B 3406-1	B 922-18 x (X528-170)	8	3.3	19.9	" " l. blight & scab
B 3406-3	" x "	9	3.4	19.9	" " " " , scab & vert. wilt.

Carstens table 2 continued

Pedigree No.	Parentage	No. plants	Yield per plant	Dry matter	Notes
			Lb.		
B 3407-3	B 922-18 x B 929-32	6	2.6	22.0	Res. to late blight & scab.
B 3407-26	" "	8	3.4	23.0	" " " "
B 3407-28	" "	7	3.7	18.8	" " " " & scab
B 3407-35	" "	10	2.8	19.9	" " " " "
B 3408-20	B 922-21 x "	6	2.7	18.8	" " " "
B 3410-18	Kennebec x Menominee	10	2.9	22.0	" " " " scab & vert. wilt.
B 3410-22	" "	10	2.6	18.8	do
B 3411-37	" x B 936-12	10	3.0	23.0	" " late blight & immune from virus X.
B 3418-10	Menominee x B881-12	9	2.8	22.0	" " scab & vert. wilt.
B 3418-15	" "	10	2.0	21.0	" " " "
B 3423-5	(X528-170 x Earlsaine	8	3.3	19.9	" " scab.
B 3423-7	" "	9	2.7	24.0	" " " "
B 3424-11	B 595-76 x B 936-12	8	2.8	19.9	" " imm. from Virus X, & late blight.
Ac25668	Epicure x(rybinii x (Katahdin)	8	3.2	19.9	
B 3436-13	Friso x Merrimack	10	3.6	25.5	" " late blight
B 3443-6	Ac25786 x(X528-170)	7	3.6	24.0	" " " " scab & vert. wilt.
B 3446-3	Ac25933 x Katahdin	9	2.8	22.0	" " late blight
B 3446-5	" "	3	7.0	21.0	" " " "
B 3446-8	" "	10	2.9	19.9	" " " "
B 3446-9	" "	10	3.3	23.0	" " " "
B 3446-11	" "	10	3.3	19.9	" " " "
B 3446-12	" "	-	--	--	" " " "
B 3446-13	" "	10	3.3	21.0	" " " "
B 3446-15	" "	10	3.8	17.7	" " " "
B 3446-17	" "	10	2.9	21.0	" " " "
B 3446-19	" "	9	4.8	21.0	" " " "
B 3446-20	" "	10	3.3	21.0	" " " "
B 3495-3	B 922-6 x B 2968-31	6	4.5	25.0	" " " "
B 3508-4	3XB-1 x B 929-32	7	2.7	17.7	" " " "
B 3508-8	" "	10	2.7	18.8	" " " "
B 3508-11	" "	6	2.1	21.0	" " " "
B 3511-21	Ac25949 x Katahdin	10	2.3	23.0	" " " "
B 3516-11	Ac25841 x(X528-170)	9	3.5	19.9	" " " " & vert. wilt.
B 3516-15	" x "	7	4.3	15.5	" " " "
B 3520-8	Ac 25960 x B 929-32	9	4.3	19.9	" " " "
B 3521-3	" x Katahdin	-	--	--	" " " "
B 3526-1	(X96-56) x HLT-4	9	2.3	21.0	" " " "
B 3526-4	" "	9	2.6	21.0	" " " "
B 1404-7	Ac25891 selfed	9	3.8	17.7	" " " "
B 1418-2	3VW-9 "	10	2.8	22.0	" " " "
X627-164	Hindenburg x Kat.	10	2.4	22.0	" " scab

Carstens table 2 continued

Pedigree No.	Parentage	No. plants	Yield per plant Lb.	Dry matter	Notes
B 926-9	B 66-1 x (X792-94)	10	2.5	21.0	Res. to scab immune viruses X, A, & late blight
OS 3031-1	B 724-1 x B 778-43	9	2.8	22.0	" " <i>spontaneous</i>
ND 457-1	N. Dak. Seedling	10	2.5	23.0	" " virus Y
B 3097-82	Kennebec x B 991-13	9	3.3	22.0	" " l.blight, ring rot, scab virus A.
B 3114-6	B 503-70 x B 991-13	9	2.7	18.8	do
B 3139-24	B 607-56 x B 402-1	10	2.3	21.0	Res. to l. blight, scab & ring rot.
B 3209-35	Katahdin x B 2067-52	10	2.8	21.0	" " viruses A and Y.
B 962-3	B 81-40 x (X245-186)	12	2.6	22.0	" " l. blight & scab
B 44-14	(X627-164) x Earline	9	3.1	22.0	" " " " "
Ac 25831	(834-C(29) from Eng.	9	3.0	23.0	" " " "
Ac 25949	From Germany	-	2.1	23.0	" " " "
B 2359-84	B 1122-25 x B 24-78	10	2.3	22.0	" " leaf roll
B 606-37	41956 x (X96-56)	9	2.5	21.0	" " l. blight & vir. X & A.
B 738-8	Katahdin x Cherokee	9	2.9	18.8	" " " " " " "
B 1268-23	Katahdin selfed	9	2.5	21.0	" " vert. wilt.
B 1268-46	" "	10	1.5	22.0	" " " "
B 2395-14	B 607-72 x B 606-3	9	2.4	22.0	" " l. blight & virus X
B 2969-15	B 1153-10 x B 878-28	9	2.0	22.0	" " leaf roll " " "
Plymouth	Mohawk x (X96-56)	7	3.4	17.7	" " l. blight & scab
Delus	" "	-	--	22.0	" " " "
Lerrimack	X96-56 x Saranac	-	--	21.0	" " " " & ring rot
B 579-3	B 24-58 x Katahdin	-	--	22.0	" " leaf roll.
B 605-19	B 76-43 x (X96-56)	10	2.7	21.0	" " late blight
X 927-3	AAP-9 x Katahdin	9	4.4	21.0	" " leaf roll.
B 929-23	(X792-88) x B 81-40	4	3.9	23.0	" " late blight, scab & virus X

WASHINGTON (Prosser)
J. D. Menzies

Uniform Scab Nursery

The Uniform Scab nursery at Prosser in 1955 contained 4 named varieties and 17 numbered selections sent by Dr. F. J. Stevenson. These were planted in 5-hill units for comparison with adjacent rows of White Rose. The field was the same as the one used for scab nursery in 1954. The scab damage of White Rose was generally less than it was a year ago.

The entire crop of each selection was harvested together with the same sized samples of White Rose tubers from the next row. The average percentage of surface area involved in scab lesions was estimated for each lot and the predominant scab type recorded. An estimate was also made of the percentage of tubers with less than 5% scab (U. S. No. 1). The small 5-hill sample does not permit close comparisons but it will be seen from the table that wide difference in scab reaction occurred.

Under the relatively light scab level of this test the named varieties Cherokee, Ontario, Menominee, and Early Gem were practically scab-free. This is in marked contrast to the results reported from Moses Lake, Wash., in 1953 when Ontario, Cherokee, and Early Gem (B 515-2) each produced less than 5% marketable tubers. The field used at Prosser this year was originally inoculated with scab by soil samples from the Moses Lake plots. This indicates that differences may be due to inoculum level rather than strain differences in the pathogen.

Among the numbered selections B 73-10 continues to test high in resistance. Most of the rest were better than the check variety, but the B 3428 selections were very susceptible, two of them showing deeply pitted lesions not seen on White Rose or any of the other selections.

Wash. table 1. Uniform scab nursery, Prosser, Wash., 1955.

Variety	Scab type	Scab Pct.	Market- able Pct.	White Rose check		
				Scab type	Scab Pct.	Mktble Pct.
Menominee	1	Tr.	100	3	10	10
Ontario	1	"	100	3	10	5
Early Gem	1	"	100	3	15	10
Cherokee	1	"	90	3	15	5
B 73-10	1	"	100	3	20	2
B 3309-4	1	"	100	3	10	5
B 3006-22	1	"	100	3	5	15
B 3429-11	2	"	90	3	5	30

(continued)

Wash. table 1 continued

Variety	Scab type	Scab Pct.	Market- able Pct.	White Rose check		
				Scab type	Scab Pct.	Mktble. Pct.
B 3107-17	2	1	80	3	5	20
B 2887-2	3	1	60	3	20	5
B 3170-33	3	1	60	3	15	15
B 3428-41	2	1	50	3	5	15
B 3114-52	2	2	75	3	10	10
B 3454-14	2	5	30	3	5	10
B 3140-36	3	5	20	3	10	15
I 801-10	3	5	20	3	10	15
I 803-3	3	10	60	3	10	10
B 3004-6	3	10	10	3	15	5
B 3428-29	5	10	5	3	5	10
B 3428-31	1	10	12	3	5	20
B 3428-8	5	10	12	3	5	20

WASHINGTON
S. B. Locke^{1/}

Tuber samples from the 1954 exposure plots were indexed in the greenhouse at Pullman during the winter of 1954-55. The amounts of leafroll infection occurring in each variety at each location appear in Wash. table 1.

Field spread of leafroll during the 1954 season was about the same as for 1953 at Prosser, but was lower than that of 1953 at Pullman and Mt. Vernon. Extremely cool and wet weather prevailed late into the summer and began early in the fall at the latter two locations. This probably was very unfavorable for the vectors. Nevertheless, field infection of about 80% occurred in one variety at these two locations.

Seedling B 579-3 showed the least infection (1.8%) followed closely by Katahadin with only 4.3% infection. The varieties Progress and Sheridan showed some field resistance to infection, but it is doubtful whether this is great enough to be of practical value. Sheridan has been tested for one year only, and its performance is, therefore, still in question.

Five varieties showed more leafroll infection than did Netted Gem which has been considered extremely susceptible to field infection.

No further field-trial plantings were made during the 1955 season. This phase of the work is now discontinued.

^{1/} In cooperation with Dr. C. L. Vincent, Department of Horticulture, Washington State College.

During the 1955 season, seedling screening for leafroll resistance was undertaken. Previously, this work has been carried on by Dr. J. D. Menzies at Prosser.

A total of 513 small seedling tubers, furnished by Dr. John McLean of Aberdeen, Idaho, Field Station, were grown successfully in the field at Pullman, Wash. All seedlings were from crosses of leafroll-resistant parents with seedlings having Russet Burbank parentage.

<u>Cross</u>	<u>Parentage</u>	<u>No. sdlg. tubers planted</u>
A316	(Giant-hill Russet Burbank x B 2361-2)	67
A317	(A101-17 x B 2361-2)	90
A322	(B2361-2 x A119-15)	67
A324	(B2361-2 x A119-15)	113
A326	(A119-15 x A24-58)	30
A327	(A119-20 x B 24-58)	83
A328	(A101-17 x B 24-58)	63
Total		513

The planting was rogued of all plants appearing to be infected with viruses. Nevertheless, a certain amount of leafroll did occur in an adjoining planting of Russet Burbank. All tubers were harvested and stored. They are now in the process of being evaluated.

During the winter of 1954-55, 1,124 seedlings were grown in the greenhouse at Pullman, Wash. These were from 4 crosses, all having one parent, in common X157-9, a russet-skinned seedling. The other parents were two leafroll-resistant varieties, Katahdin and X1276-185, and two leafroll-susceptible varieties with good baking quality, Green Mountain and Mohawk. Tuber types obtained were as follows:

<u>Cross</u>	<u>Parentage</u>	<u>Tuber shape</u>		<u>Skin texture</u>	
		Long-oval to round	Oblong to long	Smooth	Russet
		Pct.	Pct.	Pct.	Pct.
B 2032, B 2195	Katahdin x X157-9	87.3	12.7	56.0	43.9
B 2301	X1276-185 x X157-9	90.9	10.1	54.8	45.2
B 2196	Mohawk x X157-9	76.7	23.3	60.0	40.1
B 2193	Gr. Mountain x X157-9	76.4	62.6	62.6	37.4

To date, 272 of these seedlings have been tested for reaction to aphid feeding. Aphid-injury ratings (on a scale of 0 to 10) range from 0 to 9.2. Significant differences exist among the seedlings in this respect. About 10% of the seedlings have an aphid-feeding injury (AFI) rating greater than 6.0. These will be propagated and tested in the field for resistance to leafroll infection.

A number of crosses using Russet Burbank as the female parent were successfully made in the greenhouse during the winter and early spring of 1955.

No difficulty in obtaining sets was experienced when the temperature was held to 60° to 65°F. and the daylength was at least 18 hours.

Nearly 100% germination of fresh potato seed was obtained by holding the seed on moist filter paper at 5°C. for from 4 to 6 weeks and then planting without drying.

Wash. table 1. (Locke). Percentage leafroll infection occurring in the field during 1954.

Variety	Pullman	Prosser	Mt. Vernon	Variety averages
	Pct.	Pct.	Pct.	Pct.
Canso	7.6	28.3	25.7	20.5
Dazoc ^{1/}	.0	.0	5.0	1.7
Katahdin	7.4	4.3	1.1	4.3
Keswick	15.2	38.7	22.9	25.6
Manota	46.9	76.0	42.0	55.0
Netted Gem	21.3	46.3	21.9	29.8
Osage	38.5	36.0	58.0	44.2
Osseo	14.0	17.2	15.6	15.6
Red Pontiac	10.0	29.2	29.9	23.0
Progress	13.7	4.5	7.2	8.5
Pungo	16.5	34.1	40.6	30.4
Redkote	79.7	65.2	83.8	76.2
Sheridan	4.0	2.1	27.0	11.0
White Cloud	18.7	32.2	39.5	30.1
Wireworm res.	19.5	20.7	23.4	21.2
B 579-3	.0	3.2	2.3	1.8
Location Averages	19.6	27.4	27.9	

^{1/} This variety showed a high percentage of mosaic infection, making the leafroll readings unreliable.

WEST VIRGINIA
M. E. Gallegly

The work on the project "Improvement of Potato Varieties for West Virginia" carried out in the Department of Plant Pathology has been concerned with studies on resistance to late blight.

A large number of single plant selections from family lines segregating for resistance to late blight have been screened with *P. infestans* races 1,2,3; 1,2,4; 1,3,4; 2,3,4; and 1,2,3,4 to determine which of the four known genes for resistance are carried by the clonal selections. The results from some of the screening data are given in West Virginia tables 1, 2, and 3 of Westover and Marvel. All of the seedlings listed in these tables were susceptible to race 1,2,3,4. However, some selections, i.e. B 3717-5, were highly tolerant to all races indicating the presence of a high level of minor-gene resistance. Progeny from Beltsville crosses involving Accessions 25949 and 25953 were segregating for the dominant gene R_3 and minor-gene resistance. Selections from family B 3717 (Ac.25953 x B³922-3) showed the highest level of minor-gene resistance.

Progeny from crosses of various WRF seedlings (6N x 2N hybrids) with different *S. tuberosum* varieties and seedlings have been screened with the five races listed above. Segregation data indicate that some of the WRF seedlings have a new dominant gene giving resistance to the above five races of the late blight fungus. Some of the data are confusing; apparently due to the presence of a very high level of minor-gene resistance approaching the immunity given by the dominant genes.

A number of resistant selections, having either minor-gene resistance or the new dominant-gene resistance, will be sent to Dr. Niederhauser to determine their late blight resistance under the conditions in Mexico.

K. C. Westover and Mason E. Marvel

The testing and selecting of potato varieties and seedling stocks for such desirable characteristics as adaptation, appearance, yield, total solids, etc. were carried on at the Reedsville Experiment Farm by the Department of Horticulture. The breeding of and testing for disease resistance were done at Huttonsville, W. Va., and in the pathological greenhouses of the Department of Plant Pathology at Morgantown. Insofar as possible only those seedstocks known to carry resistance to late blight have been maintained. All varieties and stocks tested were carefully indexed and rogued for disease in the horticultural greenhouses at the University.

Growing conditions in this area were not favorable for the crop this season. Late spring rains followed by a dry period in early summer resulted in late

planting and retarded development of the young plants. Yields of the early varieties were moderate with an excessive proportion of small and off-grade stock. Continued wet conditions in the latter part of the growing season prolonged the vigorous vine growth of the medium and late stocks, necessitating killing of the plants at an earlier stage of maturity than normally occurs. These conditions probably account for the relatively normal total solids readings for the early seedstocks but uniformly low for the late stocks.

The plantings at the Reedsville Farm were made on deep, well-drained shale or silt loam (Clymer) soil in good tilth. A heavy wheat cover crop was turned under just before and 1,500 pounds of 5-10-10 commercial fertilizer was applied bandwise at planting time. The plantings were killed in mid-September and harvest began about 3 weeks later.

Specific gravity determinations were made from two 10-tuber samples from each row in the 40-foot row and replicated trials collected behind the digger. A single 10-tuber sample was taken from each of the 10-hill units for this purpose.

Family Line Planting. Some 400 tubers from 6 lines originating here and about 1,000 from 17 lines from Iowa were planted at 40-inch intervals by machine. From these, 53 selections have been retained for the 1956 10-hill unit plantings.

10-Hill Unit Plantings. From the 182 10-hill units planted 39 selections are held for this season's 50-foot row plantings. These have again been screened for late blight resistance this winter. W. Va. table 1 summarizes the data taken on the 25 highest yielding units. In this planting check units of certified Cobbler and Sebago occurred in alternate rows and every third unit in the row was a check. The checks in the successive rows were staggered so that each seedling unit was flanked by at least one check variety and was not more than a row removed from the other check. The plants were spaced 20 inches apart and the units were 40 inches apart in the row.

40-Foot Row Planting. This year, because of insufficient planting stock of some of the varieties resulting from intense roguing when they were indexed, 40-foot single-row plots of each stock were planted instead of the usual 50-foot rows. Twenty-six seedlings from Beltsville and Iowa and 4 recently-named varieties were included in this planting. Check plots of certified Cobbler and Sebago alternated every third row so that each trial stock was flanked by one check variety and only a row removed from the other. Eight seedlings from Beltsville and 7 from Iowa and the 4 named varieties will be planted again.

Replicated Planting. This planting contained 17 seedlings which had survived the numerous preliminary trials and 8 named varieties all but one of which are considered standard for this area. Nine of the seedlings were selections from Beltsville or were selected here from family lines received from Beltsville. The remaining 8 seedlings originally came from Iowa. This planting consisted of 4 replications of a 40-foot, single-row plot of each of the seedstocks in an incomplete block (lattice) arrangement. W. Va. table 3 summarizes the data from this planting.

In all these test plantings the distance between rows was 36 inches. In the 10-hill unit plantings the distance between sets was 20 inches and the units were 40 inches apart. In the 40-foot row and replicated plantings the sets were spaced 10 inches in the row.

W. Va. table 1. Yields, total solids and disease resistance information of 25 W. Va. selections from 10-hill unit planting yielding most. Reedsville Experiment Farm, 1955.

Variety	Parentage	U.S.#1 per A.	Off- grade	Total solids	Resistant to:
		Bu.	Pct.	Pct.	<u>1/</u>
I. Cobbler	Av. of 44 checks	267	12.0	15.7	
Sebago	Ave. of 49 checks	335	9.1	15.7	
B 3689-4 W.Va.	B 2067-52 x Ac 25953	601	11.0	17.3	LB ²⁻³
B 3715-4 "	Ac 25953 x 3ZU-5	577	6.2	17.6	LB ¹⁻³
B 3717-5 "	# x B 922-3	564	15.5	18.9	LB ^{2-3+m}
B 3739-3 "	3 NC-9 x Ac 25953	549	11.9	16.9	LB ²⁻³
B 3748-2 "	3 VW-9 x B 3160-12	519	13.4	16.7	LB ¹⁻²
B 3684-1	X927-3 x Ac 25953	506	5.2	17.3	LB ³⁻⁴
B 3715-5 "		471	10.0	17.7	LB ^{1-2+m}
B 3718-14 "	Ac 25953 x B 2131-3	458	13.5	19.4	LB ¹⁻³
B 3722-7 "	" x B 3167-28	451	11.0	18.6	LB ¹⁻³
B 3725-2 "	" x X95-56	414	7.5	16.1	
I 1324-10 "	B 595-76 x Osage	408	7.3	18.5	LB ¹
B 3715-9 "		394	16.9	18.5	LB ¹⁻²⁻³
B 3748-6 "		385	9.3	16.1	LB ¹⁻²
I 1323-14 "	B 595-76 x Ia 1077-16	369	13.2	16.8	LB ¹⁻²
B 3710-2 "	Ac 25953 x 96-56	365	16.7	18.5	
B 3684-4 "		354	15.3	18.3	LB ³
I 1324-8 "		331	13.4	18.7	LB ¹
I 1232-6 "	B 2968-60 selfed	327	8.6	16.2	LB ¹
B 3725-1 "		325	12.6	18.4	LB ³
B 3721-3 "	Ac 25953 x B 3160-12	324	18.4	17.6	LB ²⁻³
B 3682-3 "	B 922-6 x Ac 25953	315	4.4	19.1	LB ¹⁻²
B 3698-7 "	B 3160-12 x "	314	13.3	19.5	
B 3739-2 "		314	16.3	17.6	LB ²⁻³
B 3718-13 "		308	37.2	22.2	LB ¹⁻³
B 3710-3 "		297	14.3	18.3	LB ¹⁻³

1/ LB¹⁻²⁻³ etc. and m signify presence of R₁₋₂₋₃ etc. genes and minor

genes for resistance to late blight in accordance with 1955-56 screening by Gallegly.

W. Va. table 2. Yields, total solids, and disease resistance information from 40-foot-row plantings, Reedsville Experiment Farm, 1955.

Variety	Parentage	U.S.#1	Off-	Total	Resistant to:
		per A.	grade	solids	
		Bu.	Pct.	Pct.	1,2 /
I. Cobbler	Av. of 11 checks	239	20.1	18.6	
Sebago	"	408	11.7	17.1	
Saco		457	13.7	16.2	LB ¹
B 3472-23 W.Va.	Earlaine x B 929-32	405	25.5	19.8	
Delus		385	4.2	19.3	
I 1058-2 "	B 962-32 x B 762-46	379	6.2	19.0	LB ¹ -S
Merrimack		369	13.2	19.7	LB ¹
B 3409-4 W.Va.	Kennebec x Katahdin	328	29.5	17.6	LB ¹ -S ^s
B 2924-8	B 608-56 x B 594-46	327	18.9	16.1	"
B 3472-42 W.Va.		323	25.7	16.3	S ^s
I 1089-2 "	Osage x Teton	312	12.7	17.6	S ^h
I 903-4		311	14.9	15.0	S ^s
I 867-4 W.Va.	B 96-56 x B 67-11	301	13.7	17.5	S
B 3413-1 "	Kennebec x B 929-32	282	15.6	18.8	LB ¹ -S ^s
B 3413-2 "	"	278	14.5	18.4	LB ¹ -S
I 933-4 "	B 607-72 x M 113.43	267	19.8	17.4	LB ¹ -S
I 1082-2 "	N 225.43 x Cherokee	266	35.8	18.9	LB ¹
B 3475-7 "	Houma x Menominee	257	23.1	18.3	S
I 933-3 "		257	27.9	16.2	LB ¹ -S
B 3423-2 "	(X528-170) x Earlaine	219	25.1	16.8	S
Osseo		218	13.0	17.2	

1/ LB¹ signifies late blight resistance--presence of R₁ gene.

2/ S signifies scab resistance (S^s = slight and S^h = highly) --Field tests by Gallegly 1955.

W. Va. table 3. Yields, total solids, and disease resistance information from replicated trials, Reedsville Experiment Farm, 1955.

Variety	Parentage	U.S. #1 per acre	Off- grade	Total solids	Resistant to:
		Bu.	Pct.	Pct.	<u>1/</u>
Pontiac		528	13.4	15.0	
Kennebec		455	12.2	18.1	LB ¹
B 2911-32	B 446-54 x Teton	455	11.7	16.5	"
B 3320-24 W.Va.	B 922-3 x Menominee	451	11.6	16.7	LB ² -VW-S
Katahdin		432	10.9	16.3	
Sebago		400	12.7	16.6	
Chippewa		397	15.6	16.2	
B 69-16	Katahdin x 96-56	395	10.4	17.3	LB ¹
I 916-6 W.Va.	B 76-23 x N 117.43-3	373	25.5	18.6	
I 1089-2 "	B 6316 x Teton	362	11.9	16.7	LB ¹ -RR
B 313-21	Sequoia x B 96-56	353	5.5	17.9	LB ¹ -S
I 8168-1	B 6316 x B 766-88	352	6.6	16.4	LB
I. Cobbler		339	13.7	18.8	
Chenango	CUL-2	332	13.7	17.6	
B 2858-5 W.Va.	B 381-2 x Katahdin	314	14.5	18.6	LB ¹ -VA
I 933-3 W. Va.	B 607-72 x M113.43	300	22.0	18.7	LB ¹ -S
B 2070-30 "	Chippewa x B 594-46	274	30.0	18.1	"
B 1073-3 "	B 2027-Ia5 x B 962-32	257	35.8	18.6	S-RR
I 1065-3 "	B 1276-185 x B 962-9	255	23.3	19.3	LB ¹ -LR
B 922-3	TI5 x B 355-24	243	20.4	15.0	LB ²
I 1092-1 W.Va.	Teton x B 962-32	235	17.4	17.8	LB ¹ -RR
I 977-1 "	I 1712-1 x B 67-11	211	30.2	19.5	LB ¹ -S
I 1114-1 "	B 776-2 x B 962-32	211	37.5	18.0	LB ¹ -S-X
B 605-10	Pungo x B 96-56	181	21.4	18.1	LB ¹ -S
L.S.D at 5%		51.2		.9	
" 1%		68.2		1.2	

1/ LB¹⁻² etc. signifies presence of R₁₋₂ etc. for late blight resistance.

S signifies scab.

RR " ring rot.

VW " verticillium wilt.

LR " leaf roll.

X " X virus.

VA " virus A.

WISCONSIN

D. C. Cooper, R. W. Hougas, G. H. Rieman, K. I. Beamish,
R. I. Walker, J. Lee, and M. L. Magoon

This report will summarize some of the progress to date in studies of inter-specific crossability and cytogenetic investigation among the tuber bearing *Solanum* species. The 240-odd *Solanum* species andigenous to Mexico, Central America, and South America range in ploidy from $2n=24$ to $2n=72$. Improvement of the commercial potato through incorporation of various characters, such as resistance to late blight, to virus diseases, to frost, etc., reported among the *Solanum* species, necessitates interspecific hybridization with *S. tuberosum* $2n=48$.

Matings are being made between the tetraploid commercial potato and tetraploid derivatives of the diploid species ($2n=24$). The tetraploid derivatives are obtained by two methods: (1) doubling the chromosome number of the diploids by colchicine treatment and (2) crossing the diploids with the hexaploid species ($2n=72$) *S. demissum*.

Thirteen diploid species and 9 diploid species hybrids have been seed treated with colchicine to produce 22 families of tetraploids. Selections from each of the 22 tetraploid families have been used as female parents in matings with *S. tuberosum*. Eighteen tetraploid families produced viable seed when crossed to *S. tuberosum*. The resulting hybrids were, in general, quite vigorous and flowered readily. Backcrosses of the F_1 to *S. tuberosum* were obtained.

Meiotic irregularities were observed in the induced tetraploids, as well as in the hybrids with *S. tuberosum*. Multivalent association of chromosomes and univalents are not uncommon. Consequently, spores with unbalanced chromosome number may occur and result in reduced percentage of viable pollen. Unbalanced gametes on the female side rarely function since most of the progeny possess 48 somatic chromosomes.

Ten of the most late-blight-resistant selections of the Mexican hexaploid *S. demissum* were used as female parents in pollinations with 18 diploid species (*S. berthaultii*, *S. gibberulosum*, *S. gigantophyllum*, *S. goniocalyx*, *S. kesselbrenneri*, *S. laciforme*, *S. phureja*, *S. pinnatisectum*, *S. polyadenium*, *S. rybinii*, *S. saltense*, *S. schickii*, *S. simplicifolium*, *S. soukupii*, *S. stenotomum*, *S. tarijense*, *S. verrucosum*, *S. yabari*). Viable seed was obtained from 14 of the diploid-hexaploid matings. Seed set ranged from 7 to almost 200 per family. Germination of the seed was high and the resulting F_1 hybrids were, for the most part, thrifty, vigorous plants. Chromosome numbers of the F_1 hybrids, determined by meiotic counts, included both tetraploids and pentaploids. A few polyploid *S. demissum* plants were also found. Most of the F_1 were tetraploid plants. No self-fertility occurred among the tetraploid hybrids. The F_1 hybrids were used as female plants in mating with *S.*

tuberosum as well as with the selections of the late-blight resistant, Y-virus immune Mexico tetraploid S. stoloniferum. Seed set per family with S. tuberosum mating ranged from 2 to 64: seed set per family with S. stoloniferum ranged from 26 to more than 400. There was considerable variability in vigor and thriftiness within families of the trihybrids. Some of the diploid-hexaploid-tuberosum hybrids have been backcrossed to S. tuberosum and backcross populations are being grown for further study. Meiotic studies of the di- and tri-hybrids as well as backcross individuals have been made and are being continued. Study of seed development in matings which failed have been made.

The hybrids from these two phases of research are being screened for various characters, particularly resistance to disease. Some of the diploid-hexaploid hybrids have been found highly resistant to late blight.

Mating among the tetraploid species of Mexico and South America have been initiated. Certain tetraploid species, such as S. andigenum, hybridize readily with S. tuberosum. Other tetraploids, such as S. acaule and S. stoloniferum, are difficult to hybridize with S. tuberosum. Tetraploid species which do not cross readily with S. tuberosum have been treated with colchicine to obtain octaploid selections. The octaploid selections are being mated to S. tuberosum.

Some of the findings from these and related subjects have been published and others are being prepared for press. Articles published to date appear in:

Amer. Jour. Botany 41:645-651
" " " 42:297-304
Nature 176:887-888
Bul. Torrey Bot. Club 28:87-101
Amer. Pot. Jour. 32:386-387 (Abstract)
" " " 32:390 "

WISCONSIN

C. H. Rieman, D. C. Cooper, R. H. Larson, and Donald A. Young

Effect of Potato Virus X on Yield in the Chippewa Variety

The clonal lines of Chippewa listed in Wis. table 1 have been used to continue a study started during 1948 to determine the effect of virus X on yielding ability in the potato. It is planned to terminate this line of research covering 8 years with the close of the 1955 growing season.

The effect of mild strain of virus X on the yielding ability of potatoes has received very little attention at Wisconsin since the pioneer work of James Johnson, reported in 1925 in the Wisconsin Agricultural Experiment Research Bulletin No. 63.

The objective, of the series of experiments reported here was to determine the losses caused by the mild strains of virus X.

The results from 1950 presented in Wis. table 1 serve as a logical starting point to solve the problem. The following knowledge concerning certain strains of Chippewa appeared to be reasonably well established (See Wis. table 1)

Wis. table 1. Yields in bushels per acre for 13 Chippewa strains grown at Starks, Wis., during 1950.

Chippewa strains	Yield per acre ^{1/}
	Bu.
Starks strain selected for high yield (Naturally infected with virus X)	
Starks 20	550
" RC (Russet Chippewa)	516
" 2	523
" 14	546
" WB (White Blossom)	552
Average	<u>538</u>
Starks strains selected for early maturity (Naturally infected with virus X)	
Starks 5	425
" 9	392
Average	<u>409</u>
Strains selected for freedom from diseases other than virus X in seed improvement programs. (Naturally infected with virus X)	
Strain E (Eastern States)	460
" M (Maine)	484
" N (New York)	407
" " (Wisconsin)	423
Average	<u>444</u>
Strain selected for freedom from virus X Strain XF	469

^{1/} Yield tests for each of the strains were planted in 6 randomized blocks, 30 hills per replicate.

(1) That clonal selection and progeny testing can be used successfully to develop exceptionally high-yielding strains, naturally infected with virus X.

(2) That clonal selection and progeny testing can be used successfully to develop early maturing strains, naturally infected with virus X.

(3) That clonal strains of potatoes naturally infected with virus X and selected for freedom from other tuber-borne diseases in seed-improvement programs may be lower in yielding ability (444 bu.) than virus-X-infected strains selected for high yielding ability (538 bu.) or strains selected for freedom from virus X (469 bu.).

(4) That both genetic variability (genes influencing yield) and freedom from tuber-borne diseases may be involved in the development of high-yielding strains through clonal selection and progeny testing.

The results of yield tests made during 1950, 1951, and 1952 (Wis. table 2) tend to show that the strains 20, RC and WB naturally infected with virus X and selected for high yielding ability produced about the same yields as the strain XF selected for freedom from virus X but not selected for high yielding ability. Clonal selection for high yielding ability among virus-free strains of Chippewa was not possible at this time, since only a few tubers of similar origin and free from virus X were available.

The strains 5 and 9 which had been naturally infected with the virus and which had been selected for early maturity but not for high yielding ability produced consistently low yields in comparison with strains 20, RC, WB, and XF in the tests recorded in Wis. table 2. Similar results obtained in earlier tests made during 1948 and 1949 aid in positively characterizing the early maturing (2 weeks) strains 5 and 9 as being low in yielding ability. During these two seasons the average production of the high-yielding strains was 572 and 535 bushels per acre, while the average production of the low-yielding strains was 479 and 469 bushels per acre, respectively.

It appeared desirable to establish more suitable material for separating the effect of virus X on yield from the effect of genetic variability on yield. To accomplish this objective eight plants were grown in separate pots in the greenhouse from a single non-infected virus X tuber from the XF strain. The plants were tested and found to be free from virus X using the standard synergistic reaction of virus X+Y on tobacco. Six of these plants were inoculated with virus X by means of grafts from the high- and low-yielding Chippewa strains which had become infected with the virus in commercial fields previous to this study. Two plants were held virus-free. The virus X in the Chippewa strains 9, 20, RC and WB all appeared to be similar in behavior on tobacco. During the course of many routine tests (Several hundred) on tobacco it was observed that virus X sap inoculum from Chippewa strain 5 occasionally produced a decidedly delayed reaction. This variant strain was transferred to the virus free XF strain where it remained constant during several clonal generations. This virus variant called 5- is characterized by a delay in the expression of definite symptoms on tobacco inoculated with virus Y in comparison with the other virus strains including the common strain out of the Chippewa line 5 which has been designated as strain 5+. In a typical greenhouse run a definite pattern of mottling, necrosis and leaf distortion, and stunting occurs of tobacco seedlings in a period of 10 days after sap inoculation with virus Y and the virus X strains from the Chippewa lines 5+, 9, 20, RC, and WB. The 5 strain, in a run of this kind, did not exhibit these symptoms until about 20 days after inoculation and the disease pattern was less severe.

Wis. table 2. Summary of yields in bushels per acre for virus-X infected and virus-X-free Chippewa strains grown at Starks, Wis., during the 6-year period, 1950-55.

Chippewa strains	Yield per acre 1/					
	1950	1951	1952	1953	1954	1955
6 strains established by clonal selections and progeny tests. Ave. yield of strains 5 and 9 naturally infected with virus X & selected for early maturity.	409	262	427			
Ave. yield of strains 20, RC & WB naturally infected with virus X & selected for high yielding ability	539	286	521			
Ave. yield of strain XF for freedom from virus X	469	271	522			
7 strains established from a single non-infected virus X tuber from strain XF-						
Ave. yield of strains XF5-, XF5+ & XF9 graft inoculated with virus X from strains 5-, 5+ & 9				329	462	460
Ave. yield of strains XF20, XFRC and XFWB graft inoculated with virus X from strains 20, RC and WB				316	465	439
Ave. yield of strain XF selected for freedom from virus X				370	497	529
Ave. loss in yield due to virus X				13%	7%	15%

1/ Yield tests for each of the strains were planted in 6 randomized blocks, 30 hills per replicate.

The 6 inoculated lines and the 2 virus-free lines derived from a single tuber were increased in the greenhouse. They were grown under isolation and checked for virus content. The seed potatoes used to plant the 1953, 1954, and 1955 field yield tests recorded in Wis. table 2 were grown under isolation in a single field at Starks for only 1 season prior to each year's test. Exceptionally uniform seed of foundation grade was thus made available for each year of the 3-year test. Two virus-free stocks were maintained but since they appeared to be identical only one was used in the yield trials.

The yielding ability of the Chippewa strains XF5-, XF5+, and XF9 that carried the virus X from the low yielding Chippewa strains, appeared to be the same as the yielding ability of the Chippewa strains XF20, XFRC and XFWB that carried the virus X from the high-yielding Chippewa strains. From this evidence it would appear that the marked difference in performance observed in repeated tests between the low- and high-yielding Chippewa strains was probably not due to the interaction of the strains of virus X which they happened to carry. Since the low- and high-yielding Chippewa strains under consideration differs in contrasting genetic characters, such as (1) white blossom vs. pigmented blossoms, (2) russet-tuber skin vs. smooth-tuber skin, and (3) early maturing vs. late maturing, it appears likely that their differences in tuber productivity was also due to the influence of genetic variability.

This study appears well designed to measure the effect of potato virus X on yield in the Chippewa variety. The six strains of the virus used in the experiment occurred in commercial seed stocks of Chippewa and are considered to be typical for the so-called mild strains found in most American potato seed stocks. The Chippewa strain (XF) selected for freedom from virus X appeared to be at least equal in yielding ability in comparison with certified stocks from Maine, New York, and Wisconsin, as recorded in Wis. tables 1 and 2.

The genetic variability of the 7 Chippewa strains tested for yielding ability during 1953, 1954, and 1955 (table 2) has been held to a minimum by starting the strains from a single non-infected tuber from strain XF. Other seed-borne diseases were controlled by maintaining the 7 strains under strict isolation in the greenhouse and field seed plots. The yields of the 6 infected strains, graft inoculated with virus X from Chippewa strains 5-, 5+, 9, 20, RC, and WB, were similar and exhibited no significant differences. Their average yields, for convenience, have been presented in Wis. table 2 in two groups, (1) XF5-, XF5+, XF9, and (2) XF20, XFRC and XFWB. The yields of the non-infected XF strain were consistently higher than those obtained from the infected strains. The infected strains were able to exceed the non-infected strains only 14 times out of a total of 108 comparisons (30 hill replicates), and, as would be expected, the superiority of these 15 cases was small. The loss in yield due to virus X (including possible unknown viruses transmitted by graft inoculation) was 13% in 1953, 7% in 1954, and 15% in 1955, making an average loss of 12% for the 3 crop years. Similar results have been reported from Maine and from other potato research laboratories.

The Hindenburg Russet Character in Relation to Scab

The flaked type of potato tuber russetting characteristic of the Hindenburg variety was found to be associated with resistance to common scab, caused by Streptomyces scabies (Thaxt.) Waks, and Henrici, in a seedling population of 90 individuals derived from russeted scab-resistant parents. The group of seedlings with heavy russet periderms exhibited more resistance than the light russet and the smooth periderm groups. Significant differences in resistance were found between the heavy russet and light russet classes and

between the heavy russet and the smooth classes at the 1% level. No significant difference in resistance was noted between the light russet and the smooth classes. Highly resistant individuals occurred in all three classes indicating that genes responsible for resistance to scab may act independently of genes responsible for russetting. These results suggest that major genes for resistance to scab were linked with genes for the flaked type of tuber russetting.

North-Central Regional Potato Trials, 1955 (See Kehr report)

Development of Parental Inbred Clones

Objective:

1. To study the value of various systems of breeding in securing more useful parental clones.
2. To develop male-fertile clones which (1) tend to transmit a high percentage of genes governing resistance to scab, immunity to virus X, medium to high specific gravity, early to mid-season maturity, high yielding ability, and smooth tuber shape and (2) tend to transmit a low percentage of genes governing non-parasitic internal tuber necrosis, and the flake type of russet associated with resistance to scab.
3. To combine resistance to virus Y found in certain species of tuber-bearing *Solanum* from the Potato Introduction Station with immunity to virus X, and field immunity to virus A, found in promising clones of the cultivated potato.

Material and Methods:

Five outstanding clones, selected from a superior F_1 population of 145 seedlings in 1952, will be used as a base in the breeding program. Screening tests in the laboratory and field during 4 seasons indicate that these 5 sibling clones possess high resistance to scab, immunity to virus X, medium to high specific gravity, average yielding ability, and white tuber interiors low in the incidence of non-parasitic internal necrosis. In maturity 2 clones appear to be early, 3 clones have been classified as mid-season, and 1 clone appears to be late. Three clones produce tubers with light flaked russet skins and two clones produce tubers with smooth white skins. All of the lines are self-fertile. Three produce abundant pollen in the field and greenhouse. The four Wisconsin clones (X131.52, X127.52, X141.52, X143.52) have been used in crosses and have produced better than average progenies somewhat similar to the superior F_1 population from which they were selected. Inbred progenies from selfed and sibling combinations have been produced from the four clones mentioned. The fifth Wisconsin clone (X125.52) has been included in the program at a later stage because of its outstanding phenotypic appearance. The crossbred and inbred progenies have been screened for immunity to virus X. They have been tested for one season in the field for resistance to scab and selections have been made based on the phenotypic expression of desirable plant and tuber characteristics.

The breeding procedures for isolating superior parental lines are as follows:

1. Determine the breeding value of the parental F_1 sibling clones (X125.52, X131.52, X137.52, X141.52, X143.52), by crossbred and inbred progeny tests now underway.
2. Improvement of the breeding value of the five F_1 base lines by inbreeding. Two procedures will be followed:
 - a. Clones to be selected in each inbred generation on the basis of phenotypic expression. (To obtain the maximum amount of inbreeding in relation to time and work load.)
 - b. Clones to be selected in each inbred generation on the basis of (1) phenotypic expression and (2) progeny tests. (Selfed and top cross progeny tests will be used to determine genotypic selection).

The top-cross method will be used to test the progress made in the improvement of the combining ability of inbred clones over the original F_1 clones. The following characters will be given top priority: (1) high fertility, (2) resistance to scab, (3) white tuber flesh (freedom from non-parasitic internal tuber necrosis), (4) medium to high specific gravity, and (5) early to medium maturity. Important but of secondary consideration will be: (1) smooth tuber shape, (2) immunity to virus X, (3) high yielding ability, and (4) freedom from the flaked type of russet associated with resistance to scab.

3. Resistance to virus Y will be incorporated in the breeding material by crossing resistant *Solanum* clones from the Potato Introduction Station with the original F_1 clones, followed by three backcrosses to related progeny tested inbred virus X immune clones as they become available in the breeding program.

Ample quantities of remnant seed of the self and sib matings and of the top-crosses and backcrosses from the various generations will be saved for future tests under uniform conditions to determine the progress made in the retention or improvement of the combining ability of first-, second-, and third-generation inbreds over the original F_1 clones.

The progeny tests of the F_1 clones, based on plant and tuber characteristics including resistance to scab and immunity to virus X, will be completed in 1956. The first inbred generation selections based on desirable phenotypic expression were made in 1955. Evaluation studies on these first-generation inbred clones will be completed by 1957. Allowing a period of 3 years for the phenotypic selection and testing of clones in each inbred generation 9 years will be required to complete a study of 3 generations of inbreeding designed to isolate parental lines possessing more favorable combining ability. This phase of the program will be completed by 1963.

The addition of progeny testing of phenotypically selected clones in each inbred generation may prove to be highly desirable but will tend to double the time and work load required to complete the same amount of inbreeding.

A start on this phase of the program will be made and its value will be determined by a comparison with the results obtained from 3 generations of inbreeding based on phenotypic selection and the results obtained from other North Central parental line-breeding projects.

WYOMING

Wm. A. Riedl and J. R. Vaughn

Potato varieties and promising seedlings were tested for yield, specific gravity, and resistance to scab. The yield trials at Powell and Torrington were damaged by hail, and the yields at Laramie were lower than usual because of a shortage of irrigation water. In potato breeding emphasis has been placed on the development of high-yielding red-skin varieties with high specific gravity and resistance to scab.

Variety Yield Trials and Seedling Increase

Sixteen varieties and 20 promising seedlings were grown in 2 yield trials at Laramie. These were grown in rows 40 feet long and replicated 4 times. In addition, 20 new seedling selections were grown in 1-row plots 40 feet long, without replication. Ten promising seedlings were increased.

Eight varieties and 10 promising seedlings were grown in a yield trial at the Torrington substation in plots 35 feet long and replicated 4 times. A similar variety yield trial was conducted at Powell substation. The results of these trials are shown in Wyoming tables 1, 2, 3, and 4. Sixteen family lines were grown in the field at Laramie. Several desirable red-skin, scab-resistant selections were made.

Uniform Scab Nursery

The infection in the scab nursery in 1955 was medium based on the average of the check rows of Bliss Triumph planted adjacent to each row of seedling lines. Several of the lines showed good scab resistance, but the sample was not large enough to determine the quality with any degree of accuracy.

Wyo. table 1. Potato variety trial, Laramie, Wyo., 1955.

Variety	U.S. No. 1 per acre		Dry matter
	Bu.	Pct.	Pct.
Bliss Triumph	343	82	23.3
LaSoda	352	85	21.2
Red Pontiac	333	82	21.8
W 2550	340	85	24.0
Satapa	298	77	21.2
W 2548	328	86	20.1
Yampa	327	88	22.7

(continued)

Wyo. table 1 continued

Variety	U.S. No. 1 per acre		Dry matter
	Bu.	Pct.	Pct.
Kennebec	310	83	32.9
Sheridan	261	77	21.2
Early Gem	278	77	21.0
Desota	278	80	20.8
Progress	237	71	21.4
Teton	271	84	22.5
Dazoc	245	79	22.5
White Rose	203	67	20.3
Red McClure	237	83	22.9
Katahdin	203	79	22.2
Russet Burbank	144	56	23.5
Mean	278	79	22.0
L.S.D. at 5%	34		

Wyo. table 2. Potato seedling yield trial, Laramie, 1955.

Variety or seedling	U.S. No. 1 per acre		Dry matter
	Bu.	Pct.	Pct.
1. 2650	375	85	22.5
2. 2557	361*	86	21.4
3. 2688	355*	85	22.9
4. 2578	352	88	22.5
5. 2549	325*	83	22.2
6. 2662	336*	85	23.9
7. 2598	328*	87	22.5
8. 2483	293	81	22.0
9. 2541	280	81	21.6
10. 2646	268	78	21.3
11. 2542	284	83	22.7
12. 2565	290	85	23.1
13. Bliss Triumph	292	86	23.3
14. 2674	277	82	22.5
15. 2556	259	82	22.9
16. 2484	253	81	21.8
17. 2687	230	78	24.0
18. 2722	204	74	24.4
Mean	300	84	22.7
L.S.D. at 5%	50		

*Statistically equal to highest yield at the 5% level of significance.
 Previous crop, alfalfa. Planted, May 26; harvested, September 30.
 One-row plots, 40 feet long, replicated 4 times.

Wyo. table 3. Potato variety trial at Torrington and Powell^{1/}, 1955.

Torrington				Powell			
Variety	U.S. #1 per A.	Dry matter		Variety	U.S. #1 per A.		
	Bu.	Pct.	Pct.		Bu.	Pct.	
W 2598	544	78	17.8	LaSoda	244	80	
W 2557	477	72	17.3	W 2650	136	56	
LaSoda	486	73	17.5	Sheridan	157	67	
Bliss Triumph	519	78	18.4	W 2646	130	56	
Red Pontiac	484	73	17.3	W 2550	166	71	
W 2483	512	78	19.3	Dazoc	162	71	
W 2541	423	67	17.3	Desota	150	69	
W 2556	482	77	18.4	W 2541	126	58	
Early Gem	349	57	16.0	W 2484	147	70	
Desota	479	80	18.2	Teton	129	63	
Progress	391	68	18.0	Bliss Triumph	136	68	
Sheridan	423	75	19.5	Red Pontiac	133	67	
W 2550	441	78	19.7	W 2548	135	70	
W 2646	396	74	18.6	W 2556	144	77	
W 2485	396	76	21.4	W 2485	109	59	
Dazoc	387	75	19.5	Progress	100	55	
W 2484	389	78	19.7	W 2483	85	49	
W 2548	251	71	17.3	Early Gem	71	49	
Mean	435	74	18.4	Mean	135	65	
L.S.D. at 5%	76			L.S.D. at 5%	47		

Planted, May 26. Hailed, August 14. Harvested, October 6; graded, October 28.

Wyo. table 5. Potato scab uniform nursery, Laramie, Wyo., 1955
by John R. Vaughn.

Variety or seedling	Replication I			Replication II		
	TY	AR	Marketable	TY	AR	Marketable
			Pct.			Pct.
1. Menominee	0	0	100	0	0	100
2. B 3140-36	2	5	100	2	10	100
3. B 3428-31	1	10	100	1	1	100
4. I 803-3	3	10	90	2	1	100
5. B 3004-9	3	15	85	3	15	80
6. B 3454-14	1	1	100	0	0	100
7. B 3170-33	2	10	100	1	1	100
8. I 801-10	2	5	100	2	10	90
9. B 73-10	1	1	100	0	0	100
10. Ontario	1	1	100	1	1	100
11. Cherokee	2	5	100	1	1	100
12. Early Gem	0	0	100	0	0	100
13 B 2887-2	3	5	100	1	1	100
14. B 3428-8	2	20	90	3	5	100
15. B 3114-52	4	10	90	3	20	90
16 B 3006-22	2	5	100	2	5	100
17. B 3429-11	2	5	100	3	15	90
18. B 3428-41	3	10	95	3	30	75
19. B 3107-17	2	10	90	2	5	100
Check 1	4	40	70			
" II				4	50	0

